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HOOKWORM DISEASE IN AUSTRALIAN SOLDIERS, WITH REPORTS OF CASES.

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THE incidence of hookworm infestation amongst Australian army personnel has increased steadily since the early days of the New Guinea campaign in 1942. This has been shown by surveys carried out on troops after their return to Australia from this theatre of operations.

In a recent survey of an infantry battalion on Bougainville, it was found that hookworm ova were recovered from the fæces, on one examination only, of 28% of personnel of the unit. The majority of these men were free of symptoms, but some were experiencing lassitude, vague abdominal discomfort and other minor complaints. This one small survey may well be representative of many other units, which have been campaigning intermittently during the last three years in New Guinea and its adjacent islands. Ankylostomiasis, unless it is borne in mind, is likely to provide diagnostic pitfalls for practitioners dealing with members of the Australian forces after this war. In this respect, it may be bracketed with malaria and amœbiasis, two other diseases which have occurred amongst service personnel, the former in greater and the latter in lesser numbers, and which may produce symptoms in these men in future years.

The object of this report is to place on record certain experiences of hookworm disease as encountered in an Australian general hospital, firstly in New Guinea, and later on Bougainville.

EXPERIENCES IN NEW GUINEA.

In a period of nine months at Port Moresby during 1943-1944, hookworm disease amongst Australian troops was found to be a relatively mild condition, with very few exceptions. In a large number of cases, the infection was to all intents and purposes a chance finding. For example, an excess of eosinophile cells was noted in the routine examination of a thick blood film taken for malaria, or eosinophilia was encountered in a white blood cell count made for some purpose other than as a lead to the diagnosis of ankylostomiasis. Both of these findings were regarded as an indication for a search for hookworm ova, and in quite a proportion of such cases these were found. Again, in the routine investigation of fæces from patients suspected of suffering from bacillary or amœbic dysentery, hookworm ova were sometimes found when the possibility of ankylostomiasis had not previously been considered. The majority of these patients were free from symptoms suggestive of this infestation.

However, in another group the diagnosis was hinted at by the clinical findings. Common symptoms were lassitude, epigastric and other vague abdominal discomfort, and the effects of moderate anæmia, such as dyspnœa on exertion or œdema of the ankles. A history of "ground itch" was uncommon. Any patient with anæmia, unless it was due to some other obvious cause, was suspected of having hookworm disease. Not only were some of these men pale, but this pallor was associated with a peculiar earthy colour, to which was added a faint patchy pigmentation. The whole effect was to produce a facies which came to be regarded as arousing suspicion of ankylostomiasis, and in such cases routine examination of the fæces for ova was carried out.

The anæmia was of the normochromic and normocytic type, and not the hypochromic and often microcytic type usually described. In the cases encountered in New Guinea, only rarely was the hæmoglobin value found to be below 11 grammes per 100 millilitres.

The routine treatment employed was the administration of either tetrachlorethylene (four millilitres) or carbon tetrachloride (three millilitres), both used in association with one millilitre of oil of chenopodium. A follow-up investigation of the stools on the eighth day was made and if ova were still present, the "drench" was repeated. Only a small minority of patients failed to become free of ova

after two courses of treatment. To those patients found to be anæmic, ferrous sulphate (three grains, three times a day) was given, and unless some other complicating condition was present, the anæmia was corrected rapidly. The general condition of the patient was improved by the good and varied ward diet, and when it was thought necessary, vitamin B_1 and ascorbic acid were given in tablet form, in the dosage of nine and 75 milligrammes per day respectively.

The foregoing is a brief description of hookworm disease as encountered amongst troops in New Guinea. It came to be regarded, in the great majority of cases, as a relatively minor malady. Not one patient was severely ill, there were no complications, and treatment was found to be perfectly satisfactory.

Experiences on Bougainville.

This part of the report is based on experiences with this disease gained in the medical wards of the hospital between January and June (inclusive), 1945. The greater number of cases conformed to the type met with in New Guinea. However, three patients developed an acute and severe form of the disease, and others gave a classical history of the early invasive symptoms of this infestation in their chronological order. The main purpose of this paper is to record the findings in these three cases, for, as far as can be ascertained, no report of similarly acutely ill patients suffering from this disease amongst Australian troops in this war has so far appeared.

Ankylostomiasis is prevalent amongst the natives on Bougainville, and all Japanese prisoners of war taken in this theatre of war have been found to be suffering from this disease. It is certain that both the natives and Japanese have polluted the ground with fæces containing hookworm ova, but which have been the more responsible is difficult to decide.

Operations on certain parts of Bougainville necessitated passage of troops through considerable areas of swampy jungle, and sometimes they were up to their chests wading through muddy water. Several gardens, which contained evidence of recent Japanese occupation associated with unhygienic conditions regarding fæces disposal, were overrun. It was from some of the troops who had passed through these areas that a typical history of infection was obtained.

"Ground itch", often amounting to intense pruritus, was the initial symptom. This usually occurred on the lower parts of the legs or the buttocks, the latter site especially in the case of those who had sat on the ground in one of the gardens. From the notes previously recorded about the patients before their arrival at hospital, and from the descriptions of the patients themselves, a vesicular erythematous eruption was the usual associated skin lesion in the early stages. A number of these men stated that the severe itching appeared within as short a period as one or two minutes after their sitting on the ground; others said that the irritation on the legs or buttocks first occurred a few days later.

Five to seven days afterwards an irritating cough often developed, and this was sometimes associated with the complaint of a sore throat and substernal rawness, and the appearance of sputum which in two or three cases was blood-stained. In several instances these men were regarded as suffering from an upper respiratory tract infection, which was closely simulated, even to the congestion of the pharynx. The cough often lasted for a month or more, and in a number of cases gave rise to the erroneous diagnosis of "bronchitis". Admittedly, this condition was often engrafted, and scattered rhonchi could be heard throughout the lungs.

Several weeks after the onset of the itch, and in a few cases within as short a period as two or three weeks, symptoms referable to the abdomen usually developed. The commonest of these was epigastric or paraumbilical discomfort or even pain. It may be mentioned here that abdominal pain can be of great intensity, usually being situated in the epigastrium; but it may become generalized over the abdomen. This type is uncommon, but has recently been described in Australian troops in the Aitape-Wewak sector in New Guinea. The severe pain is often in the nature of cramp, and may be associated with vomiting. The importance of the recognition of this pain as occasionally occurring in ankylostomiasis is that otherwise, owing to its resemblance to that produced by a surgical emergency, an unnecessary laparotomy may be performed. Some patients suffered from nausea, and the majority complained of anorexia. An admission diagnosis of "dyspepsia, for investigation" was not uncommon. An interesting feature was the occurrence of intermittent diarrhœa with watery motions. A number of patients were regarded as suffering from dysentery, and it was not uncommon to find that the patient had been given several short courses of sulphaguanidine, to which his diarrhœa had proved unresponsive.

Such, then, was the typical history obtained from some 25 patients, who were later proved to be suffering from ankylostomiasis. They furnished a textbook description of the early invasive symptoms and clearly demonstrated the path taken by the filariform larvæ in the body in this disease: (i) boring through the skin to enter blood vessels and lymphatics; (ii) being transferred to the lungs, giving rise to an irritation in these organs; (iii) entering into the air passages of the lungs, migrating up the bronchi and trachea into the œsophagus; (iv) descending into the stomach, thence to the duodenum and jejunum, to the mucous membrane, of which they become attached by their powerful buccal armature, giving rise to epigastric and other abdominal discomfort, and finally, by their withdrawal of blood, to the anæmia which is so characteristic of this disease if untreated.

Diagnosis of the Disease in Hospital.

Fæces Examination.

The fæces from any patient presenting such a typical history as has been related were immediately examined for hookworm ova, and this examination was repeated several times if the initial investigation gave negative results. In a number of cases studied during the early invasive stages of the disease—that is, three to five weeks after the first symptom of itch—fæces examinations for hookworm ova gave negative results. At a later date these ova were found, or the diagnosis was made after the administration of vermifuges and the recovery of young adult hookworms. From some of the patients on Bougainville *Ankylostoma duodenale* was recovered, and from others, *Necator americanus*.

In view of the above experience it is interesting to quote the following reference from "Stitt's Diagnosis, Prevention and Treatment of Tropical Diseases":[1]

> If infected soil comes into contact with the skin, stimulated probably by the warmth, the larvæ become very active and burrow through the skin . . . and reach the intestine about one week after infection, having undergone a third moulting. The larvæ grow rapidly, undergo a fourth moulting after another week (when they measure about 2 mm. by 0·13 mm.), and reach maturity about a month after entering the body. Sai Ryo (1937), who placed 300 Ancylostoma larvæ on the skin of three volunteers, found eggs in their fæces on the 54th, 55th and 57th days. He thought that in such instances between 290 and 295 of the larvæ penetrated the skin. By treatment, he recovered adult worms numbering 77, 78, and 83 respectively from their fæces.

Eosinophilia.

That eosinophilia is a common accompaniment and helpful lead to the diagnosis of hookworm disease is well known. Two methods have been used in this hospital. The first is the examination of a thick blood film for an excess of eosinophile cells. In many cases this simple procedure proved quite satisfactory. In the cases under discussion, a 30% to 40% eosinophilia was commonly found. The second method is a white blood cell count. The absolute count of eosinophile cells is much more informative and reliable than the percentage figure in a differential count, and no eosinophile count of less than 400 per cubic millimetre was taken as being of significance. A count above this figure was regarded as warranting a search for hookworm ova, the other causes of eosinophilia being borne in mind, such as certain skin diseases, allergic

conditions, other intestinal helminth infections, the so-called tropical eosinophilia of Wiengarten, and Löffler's syndrome. The highest absolute eosinophile count found was 51,000 per cubic millimetre, representing 85% of 60,000 white blood cells per cubic millimetre. This was encountered in a patient (Private N.) who was in the convalescent stage of his illness, after having recovered from an acute form of the disease accompanied by severe anæmia. Several of the patients studied were notable for extremely high eosinophile counts, which are referred to in the descriptions of the cases appearing later.

The sputum of a few patients was examined during the early invasive period, and when lung symptoms were present. In a number of instances a percentage increase of eosinophile cells was present, and in one acute case these amounted to 80% of the white blood cells present. No larvæ were found in any of the specimens of sputum examined.

One patient arrived at hospital within a week of the appearance of the initial skin lesions. Fluid obtained from the vesicles contained 50% of eosinophile cells.

Patients with a Typical History during their Invasive Period.

The following cases are briefly described to illustrate the points enunciated in the foregoing description of the disease.

A trooper, aged thirty-seven years, from a cavalry commando squadron, had been subject to mild attacks of "bronchitis" for three months. Six weeks prior to his admission to hospital he sat in an old Japanese garden. Several days later an irritating rash developed on his buttocks, and four days later he noticed that his cough had increased, and that he had a mildly sore throat. Examination disclosed the patient to be a healthy-looking young man, and a few scattered rhonchi in the lungs were the only physical signs of disease. An X-ray examination of his lungs disclosed no significant abnormality. The hæmoglobin value was 15·5 grammes per 100 millilitres and the white blood cells numbered 14,500 per cubic millimetre, 54% being eosinophile cells. Examination of his fæces disclosed hookworm ova. Vermifuges were given, and adult forms of *Ankylostoma duodenale* were recovered. Hookworm ova were still present three days later. He made an uninterrupted recovery.

A trooper, aged twenty-two years, from the same cavalry commando squadron, two months prior to his admission to hospital had sat in a Japanese garden. He stated that within one minute of his so doing an intense irritation was felt on his buttocks, which later developed into a "red rash with small blisters on it". Two days later he had a cough and sore throat, the former lasting about one month. Six weeks prior to his admission to hospital intermittent diarrhœa occurred, up to six stools being passed daily; the diarrhœa was not associated with the passage of mucus or blood. He had experienced epigastric pain, and had occasionally vomited. His diarrhœa proved unresponsive to three separate courses of sulphaguanidine therapy. On his admission to hospital, the patient was noticed to be pale, and indefinite epigastric tenderness was present. Beyond these two findings, physical examination gave negative results. The hæmoglobin value of his blood was eight grammes per 100 millilitres, and the red blood cells numbered 3,500,000 per cubic millimetre. The white blood cells numbered 15,500 per cubic millimetre, 33% being eosinophile cells. The first examination of his fæces disclosed no hookworm ova, but these were found in the second specimen. Vermifuges were given, and were followed by the recovery of adult forms of *Necator americanus*. He had been given iron, and twelve days after the original blood count, the hæmoglobin value was 11·5 grammes per 100 millilitres. Soon afterwards he was discharged from hospital.

A trooper, aged twenty-two years, from the same cavalry commando squadron, seven weeks prior to his admission to hospital had sat in a Japanese garden. Within ten minutes an itch developed on his buttocks; this was followed within a few days by a rash. One week later a cough appeared, together with a sore throat. For the three weeks prior to his admission to hospital he had experienced epigastric discomfort and diarrhœa which was unresponsive to three separate courses of sulphaguanidine therapy.

Upon his arrival at hospital, examination disclosed no abnormal physical signs. Examination of a thick blood film revealed an eosinophilia of 40%, and the hæmoglobin value was 14 grammes per 100 millilitres. Hookworm ova were found in his fæces, and adult forms of *Ankylostoma duodenale* were recovered after vermifuges had been given. His response to treatment was satisfactory.

A private soldier, aged twenty-six years, from an infantry battalion, shortly after wading through swampy ground recently occupied by Japanese, noticed a severe itching around his ankles. Five days later he developed a cough, a feeling of substernal rawness, and a sore throat. In the forward area his temperature was found to be 101° F. and his pharynx congested. He was treated with sulphathiazole for an upper respiratory tract infection. On his admission to hospital, approximately four weeks after the onset of the itching, he was noticed to be pallid and his voice was husky, but apart from these findings there was no clinical evidence of disease. The white blood cells numbered 30,000 per cubic millimetre, 70% being eosinophile cells. No hookworm ova were recovered from the fæces in four separate examinations performed on successive days. He was then given vermifuges, and adult forms of *Ankylostoma duodenale* were recovered; they contained red blood cells and immature ova. Seven days later he was "drenched" again; at this stage the hæmoglobin value of his blood was 14 grammes per 100 millilitres, and the white blood cells numbered 25,900 per cubic millimetre, 50% being eosinophile cells. He made an uninterrupted recovery.

Acute Forms of Hookworm Disease.

At this hospital attention was focused on ankylostomiasis by the observation of three patients who developed anæmia of rapid onset and great severity; their records will be described in detail later.

After troops in New Guinea had been dealt with, the impression was gained that amongst them this disease was a relatively minor condition, often associated with mild anæmia, dyspeptic symptoms and eosinophilia, sometimes with a history of "ground itch", complications, if any, were few, the prognosis was good, and response to treatment was satisfactory. However, the three cases to be described later carried with them a salutary lesson as to the acute form that ankylostomiasis can take, especially with regard to the anæmia.

Admittedly the usual form of the disease is a chronic malady extending over months or years. Owing to the prolonged and often repeated infestation, anæmia of increasing severity ensues, debility or a dangerous cachexia follows, retardation of mental and physical development occurs in children, and by virtue of the general impairment in health, the subject is exposed to intercurrent and terminal infections. All authorities stress the point that a poorly balanced or inadequate diet is an important factor in the occurrence of advanced forms of the disease. This was certainly not so in the cases studied.

Controversy still exists about the possible factors involved in the production of the anæmia—namely, (*a*) chronic blood loss, (*b*) absorption of a specific hæmolytic toxin, (*c*) repeated bacterial infection through the lesions produced by the parasite in the intestine, and (*d*) unfavourable diet. However, there seems little doubt that in severe infestations it is the mechanical blood loss brought about by the worms that gives rise to the anæmia. It has been estimated by one investigator that a single worm is capable of withdrawing as much as 0·84 millilitre of blood per day. In the presence of a heavy infestation of a thousand worms or more, it is easy to understand how rapid and severe anæmia may be produced.

That frank melena is rarely met with in this disease, as in the three cases to be described, is evident from the writings of authorities. Thus Manson-Bahr[2] writes as follows:

> The stools sometimes, though rarely, have a reddish brown tinge from admixture of half-digested blood. Sometimes they may contain small flakes of blood-tinged mucus. Pure blood is seldom passed; and an extensive hæmorrhage, unless there be concurrent colitis, is rare, although, post mortem, considerable quantities may be found in the small intestint.

Manson-Bahr goes on to state that "acute cases develop terminal diarrhœa with passage of much mucus, and

occasionally, blood. These cases are apt to be mistaken for various forms of Dysentery".

Again, Strong, in "Stitt's Diagnosis, Prevention and Treatment of Tropical Diseases" simply states that, "constipation is rather a common feature, though diarrhœa may occur. The stools may very rarely show macroscopic blood. In a few instances, bloody mucus has been reported". A technical instruction on ankylostomiasis, issued by the Director-General of Medical Services, Australian Military Forces, states that "constipation is the rule, but occasionally intermittent diarrhœa occurs. Macroscopic blood in the stools is uncommon".

Description of Three Cases of Acute Hookworm Disease.

Private R., aged twenty nine years, from an infantry battalion, became ill on January 31, 1945, when an itchy rash developed over the right knee and the lower part of the right leg. A fortnight later cough and sputum appeared, and a week afterwards he was admitted to a field ambulance with pyrexia, aching pains in the muscles, and symptoms of an upper respiratory tract infection. Two days later he developed diarrhœa, which was not controlled by sulphaguanidine, and he was regarded as possibly suffering from amœbic dysentery. He was passing dark fluid stools in which no blood or mucus was present on macroscopic examination; microscopic examination disclosed many red blood cells, but no amœbæ, ova or cysts. On March 6, 1945, the hæmoglobin value of his blood was eight grammes per 100 millilitres. He was admitted to hospital the following day, still passing three to four fluid stools per day, and with a history of great lassitude for the ten previous days. On examination of the patient, his mucous membranes were pale and an apical systolic bruit was present, but otherwise there were no physical signs of disease. His initial blood findings on March 7, 1945, were as follows: the hæmoglobin value was five grammes per 100 millilitres and the red blood cells numbered 2,100,000 per cubic millilitre; the white blood cells numbered 19,000 per cubic millimetre, 31% being eosinophile cells (an absolute count of 5,890 per cubic millimetre).[1]

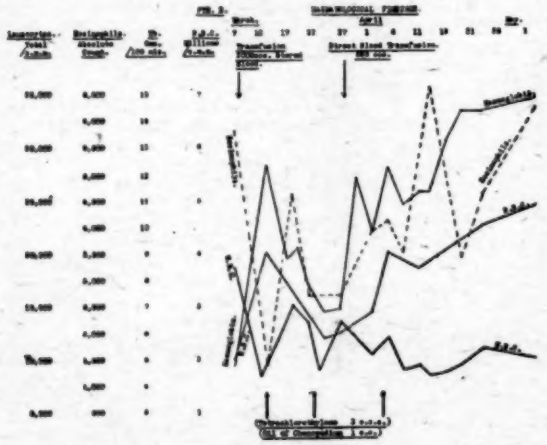

Figure I.

On March 8 a transfusion of two litres of stored blood was given. An X-ray picture taken on that day disclosed no abnormal findings in the lungs. No eosinophile cells, larvæ or fungi were found in sputum examined on this same date.

He continued to pass watery fæcal stools, in which much blood was visible on macroscopic examination; but no cysts, amœbæ or ova were found, and no pathogens were isolated on attempted culture.

Between March 9 and March 11 three further specimens of fæces were examined. On microscopic examination they were found to consist of almost pure hæmolysed blood, and again no ova, cysts, amœbæ or pathogens were discovered. The frank melena continued.

[1] No further reference is made here, in the description of this case, to subsequent blood investigations. They are detailed in graph form in Figure I.

On March 13 he was given three millilitres of tetrachlorethylene and one millilitre of oil of chenopodium, and a mixture containing 30 grains of iron and ammonium citrate was administered three times a day. Three of the first four stools passed after the "drench" had been given were examined for hookworms. Unfortunately the third specimen, passed in the middle of the night, was discarded. From the three specimens, 2,500 adult forms of *Necator americanus* were recovered. Reference is again made here to the fact that previously, five specimens of fæces had been examined on separate days and no hookworm ova had been found. On March 15, on macroscopic examination, dark blood was obviously still present in the fæces, and four days later the fæces were still free of ova. On March 22 the "drench" was repeated, 360 adult forms of *Necator americanus* being recovered in the first three stools passed afterwards.

The patient had been given a diet rich in protein, with added vitamins B_1 and C. On March 27 the bleeding time was 60 seconds and the coagulation time 50 seconds, and the blood platelets numbered 290,000 per cubic millimetre. A sternal puncture was performed for evidence of any depression of the bone marrow, or inhibition of maturation of the erythroblastic series. The pathologist's report gave the following information: nucleated red cells numbered 150,000 per cubic millimetre; of the leucocytes, 0·3% were myeloblasts and 1·5% were premyelocytes; of the neutrophile leucocytes, 5·1% were myelocytes, 10·4% were juvenile forms, 12·9% were band forms and 13·5% were segmented; of the eosinophile leucocytes, 8·5% were myelocytes, 6·5% were juvenile and band forms and 10·0% were segmented; 3·5% of the leucocytes were lymphocytes and 0·2% monocytes; of the red cells, 0·8% were proerythroblasts, 1·5% were early erythroblasts, 11·8% were late erythroblasts and 13·8% were normoblasts. The bone marrow was hyperplastic, but the hyperplasia was confined mainly to the eosinophile series, in the cells of which many mitotic figures were present. The number of megakaryocytes was found to be within normal limits. There was no retardation or suppression of the red cell series.

On March 28 the patient was given 568 millilitres of blood by direct transfusion. On April 1 hookworm ova were found in the fæces for the first time—that is, sixty-one days after his intial symptom of "ground itch". Three days later the "drench" was repeated, 315 adult forms of *Necator americanus* being recovered from the first two stools passed afterwards. Thus when allowance is made for the worms that must certainly have been present in the discarded stool after the first "drench", it can be estimated that the heavy infestation in this patient was in the vicinity of 3,500 worms. No hookworm ova were found in his fæces at three separate examinations carried out between April 10 and April 13. A bilharzia complement fixation test was performed on serum flown to Australia; the result was negative.

The patient was allowed out of bed, and on May 11 he appeared quite well, had a normal, healthy colour, and was completely free of symptoms. During his illness, his temperature remained normal except for a mild pyrexia up to 99° F. from March 11 until March 17. On May 22 he was transferred to the convalescent depot.

The main features in this case are as follows: (*a*) the early invasive symptoms, (*b*) the occurrence of frank melena, (*c*) the rapid onset and severe degree of anæmia, (*d*) the magnitude of the infestation, with the recovery of approximately 3,500 adult worms (*Necator americanus*) after three courses of vermifuges had been given, (*e*) the satisfactory response to treatment.

Private N., aged nineteen years, from an infantry battalion, "reported sick" on February 13, 1945, when he noticed that he became dizzy and experienced a pounding sensation in his head after walking short distances. He had then been in the tropics only four months, and during this time he had lost two stone in weight. For the three weeks prior to his admission to hospital his appetite had been poor and he had noticed occasional mild, indefinite, abdominal pain. On February 20 he was admitted to a field ambulance, where he was noticed to be pale. Examination of blood films taken there revealed no malaria parasites and no hookworm ova were found in his fæces. He was admitted to hospital on March 2, with the diagnosis of "anæmia, for investigation". Further interrogation elicited a history of cough, which had developed on about January 26 and had lasted for a period of three weeks. There was no history of diarrhœa or "ground itch". He had been in areas known to be infested with hookworm.

Examination in hospital disclosed that the patient was a thin, pale boy. Some enlarged, firm, but not tender glands were palpable in both groins, axillæ and posterior triangles of the neck, but no other abnormal physical signs were present. A blood examination was carried out on the day of his admission to hospital, with the following results: the hæmoglobin value was 4·5 grammes per 100 millilitres: the erythrocytes numbered 1,700,000 per cubic millimetre and the leucocytes numbered 15,000 per cubic millimetre; of the leucocytes, 25% were neutrophile cells, 59% were eosinophile cells, 1% were basophile cells, 10% were lymphocytes and 5% were monocytes.

The results of subsequent blood examinations are detailed, in graph form, in Figure II. Examination of several blood films disclosed no malarial parasites. A transfusion of two litres of stored blood was given on March 3, and on the following day numerous hookworm ova were found in the fæces; this finding was suggestive of a heavy infection.

As the result of the transfusion, the patient's condition was considerably improved. An X-ray film of his lungs taken on March 8 disclosed no abnormality, and a benzidine test on his fæces, which were dark in appearance, produced a strongly positive reaction.

On the following day he was given four millilitres of tetrachlorethylene. His general condition began to improve. On March 10 treatment with an iron and ammonium citrate, 30 grains in a mixture, three times a day, was instituted; this was discontinued after three days, owing to the apparent bowel irritation resulting therefrom. An examination of his fæces on March 17 revealed only occasional hookworm ova present. A further "drench" of three millilitres of tetrachlorethylene was given on the following day.

On March 22 no ova were found in the fæces. On March 23 a further transfusion of two litres of stored blood was given, as the general condition of the patient did not appear to be as good as a week previously, and his hæmoglobin value had commenced to fall again. Three days later he was given his third "drench" of four millilitres of tetrachlorethylene; after this adult forms of *Necator americanus* were recovered from his stools. A further X-ray film of his lungs taken on March 27 disclosed no abnormality.

From this time onwards he made rapid strides towards recovery, with full correction of his anæmia. By April 3 he was feeling and eating well, and moving about the ward without discomfort. On April 21 hookworm ova were still present in his fæces; but he was steadily gaining in weight, retaining his healthy appearance and complaining of no symptoms. He was given occupational therapy in the pathology department, and, appropriately enough, became apt at the identification of hookworm ova. His fæces still contained ova on May 19 and two days later he was given his fourth "drench" of four millilitres of tetrachlorethylene and one millilitre of oil of chenopodium. Only five adult worms (*Necator americanus*) were recovered from three specimens of fæces passed afterwards.

He remained perfectly well, with no anæmia; but his white blood cell count was found to be 60,000 per cubic millimetre, 85% of the cells being eosinophile. It was decided to retain him in hospital for further observation.

On June 9 his fæces were examined, but no hookworm ova were found. By this time his white blood cell count had dropped to 15,000 per cubic millimetre, 60% of the cells being eosinophile. On June 19 he was discharged to the convalescent depot, feeling well; his hæmoglobin value was 15 grammes per 100 millilitres, and his blood cell count was 15,000 per cubic millimetre, eosinophile cells constituting 54%. Except for mild febrile reactions after both transfusions, he was apyrexial during the length of his stay in hospital.

The main features in this case are as follows: (*a*) the rapid onset and severe degree of the anæmia; (*b*) the occurrence of melena; (*c*) the extreme degree of eosinophilia, the absolute count rising to 51,000 cells in the convalescent period; a striking drop in the eosinophile count occurred after the final "drench"—this is shown to advantage in Figure II; (*d*) the satisfactory outcome, full health being rapidly regained after blood transfusions and the administration of four courses of vermifuges.

Private S., aged twenty years, from an infantry battalion, was admitted on February 13, 1945, to one of the skin wards of the hospital complaining that he had had an itchy skin eruption on his legs and in his groins for the previous fortnight. In addition, for the preceding week he had had a cough with a little sputum, and a sore throat.

Examination disclosed a squamo-erythematous eruption in the groins and on the legs, and congestion of the fauces. Mycelium of *Microsporum minutissimum* was recovered from a skin scraping. Examination of a thick blood film revealed eosinophilia. No malarial parasites were seen in this film, or in several blood films examined subsequently.

On the day of his admission to hospital his temperature was 100·2° F.; six days later it had fallen to 99° F., but on February 22 it rose to 103° F. He was still complaining of a sore throat, and vague abdominal pains with vomiting had developed. His fauces and tonsils remained congested, but no exudate was present. An examination of his fæces on this date revealed no hookworm ova.

On February 23 signs developed suggestive of early pneumonia at the base of the right lung, and sulphamera-

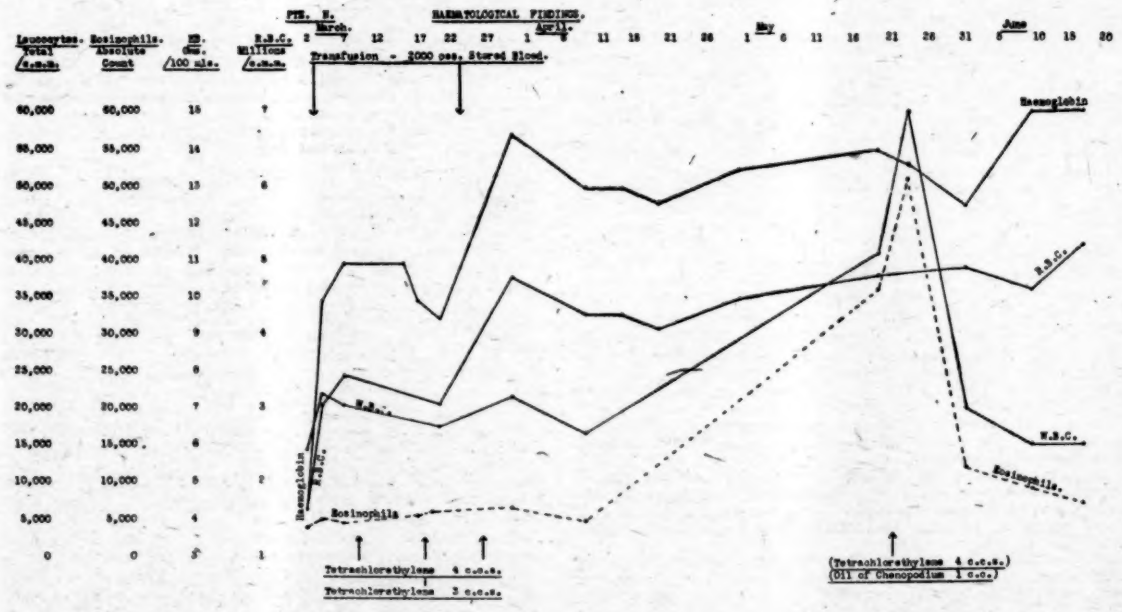

FIGURE II.

zine therapy was promptly instituted. Another examination of fæces on the following day disclosed no hookworm or other ova. The pyrexia continued.

On February 25, impaired percussion note, increased vocal fremitus and post-tussive crepitations were found posteriorly over a localized area in the middle zone of the right lung. On this day, a blood count gave the following results: the hæmoglobin value was 13·5 grammes per 100 millilitres and the leucocytes numbered 25,200 per cubic millimetre; of the neutrophile cells, 4% were juvenile, 5% were band forms and 51% were segmented; of the remaining leucocytes, 16% were eosinophile cells, 1% were basophile cells and 15% were lymphocytes.

The results of further blood examinations are detailed in graph form in Figure III.

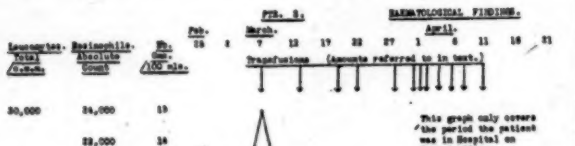

FIGURE III.

No ova were present in the third and fourth specimens of fæces examined.

On February 26 an X-ray film of his lungs revealed a diffuse opacity in the lower zone of the right lung, not involving the area immediately above the diaphragm, and pneumonic consolidation of the middle lobe. No acid-fast bacilli were present in three specimens of sputum examined. On March 1 sulphamerazine treatment was suspended, as the pyrexia and lung signs had not responded to this therapy. The following day another X-ray film of his lungs revealed that some resolution had taken place. Clinically, because of the localized nature of the physical signs, and because of the fact that he was coughing up purulent sputum, a lung abscess was suspected at this stage. His temperature continued to vary between 99° and 101° F. and he had the general appearance of illness. On March 3 another specimen of fæces was examined, but no hookworm or other ova were found. His hæmoglobin value was then 12 grammes per 100 millilitres of blood, and treatment with ferrous sulphate was instituted, three grains three times a day.

On March 5 examination of his sputum revealed profuse polymorphonuclear pus cells, 80% of which were eosinophile. The sputum contained numerous streptococci and Gram-positive cocci in pairs and clumps, but no scolices or acid-fast bacilli; monilia, *Streptococcus viridans* and *Staphylococcus aureus* grew on culture.

On March 7 his hæmoglobin value had dropped rapidly to 5·5 grammes per 100 millilitres of blood. A transfusion of two litres of stored blood was given on this day. On March 8, 1945, much macroscopic blood was present in the stools, two specimens of which were examined for ova, with negative results. The Casoni test produced negative results, and examination of several nocturnal blood films disclosed no microfilaria.

On the following day the third X-ray film of his lungs was taken, and this revealed an abscess cavity, with a fluid level in the upper part of the lower lobe of the right lung. Eosinophile cells were still present in large numbers in the sputum, and his temperature continued to swing up to 101° F. He was obviously seriously ill. On March 9 he continued to pass liquid fæcal stools, which contained no exudate or ova, and from which no pathogens were recovered on attempted culture. The occult blood test produced a strongly positive reaction.

On the following day hookworm ova were recovered from his fæces for the first time since his admission to hospital on February 13 and thirty-eight days after the occurrence of the initial itchy skin lesion. He had been started on continuous intramuscular penicillin treatment on March 8, but this was discontinued on March 11 after the administration of 300,000 units, as his temperature had proved unresponsive to this therapy.

On March 12 he was given three millilitres of tetrachlorethylene and one millilitre of oil of chenopodium. Hookworm ova, but no worms, were recovered from the fæces passed after the "drench". On March 13 he was given a second transfusion of 2,000 millilitres of stored blood. By this time the lung signs were beginning to diminish. He continued to pass three or four liquid stools per day, containing much macroscopic blood, and by this time abdominal colic had become his most distressing symptom. On March 19, owing to the falling hæmoglobin value of his blood, he was given another transfusion of two litres of stored blood, and the second "drench" with three millilitres of tetrachlorethylene and one millilitre of oil of chenopodium was administered. On March 22 he was given 23 ounces of blood by direct transfusion. The following day a further X-ray examination of his lungs was made; this revealed a considerable improvement in the right lung; the abscess cavity was no longer definable, although some slight residual opacity remained.

On March 26 the bleeding time was one and a half minutes and the clotting time 55 seconds, and the platelets numbered 200,000 per cubic millimetre. On March 27, 1945, his stools continued to contain much blood, considerable numbers of hookworm ova and no amœbic cysts. A sternal puncture was performed on March 27; the pathologist reported that in the sternal marrow the total number of nucleated cells was 120,000 per cubic millimetre. In the red cell series 0·5% were proerythroblasts, 7·0% were erythroblasts and 13·0% were normoblasts; the eosinophile series made up 30% of the total nucleated cells. The bone marrow was hyperplastic, mainly in the eosinophile series. There was no retardation or suppression of the red cell series.

On March 28 a further transfusion of 2,000 millilitres of stored blood was given, and on the following day he had his third "drench". Examination of his stools after this showed them to be packed with hookworm ova, and a few adult worms (*Necator americanus*) were also recovered.

The intestinal hæmorrhage continued, the hæmoglobin value continued to drop after each transfusion, and it was proving a task to keep him supplied with sufficient blood. On March 31, 21 ounces of blood were given by direct transfusion; a further 29 ounces were given on the following day, and 23 ounces again on the day afterwards. He was desperately ill, and the prognosis appeared bad. He had by this time lost a considerable amount of weight, he was having drenching sweats, although his temperature had fallen lower (99° and 100° F.), and he was continually complaining of colicky abdominal pains. His abdomen was diffusely tender. On April 4 he was again given a direct transfusion of 30 ounces of blood, and 32 ounces and 36 ounces of blood were given respectively on April 6 and April 8. On April 9 he was given a fourth "drench" of three millilitres of tetrachlorethylene and one millilitre of oil of chenopodium. Adult worms were present in the first two stools passed afterwards; but unfortunately they were not counted. However, from the third stool after the "drench", 500 adult worms (*Necator americanus*) were recovered.

From this time, he began to show a slight improvement and his abdominal pains lessened. On April 11 he was given 20 ounces of blood by direct transfusion. Until this date, and during the period since his admission to hospital on February 13, he had been given 494 ounces of blood.

On April 12 he was feeling much better, and his general condition had improved. His temperature was gradually falling, and varied between 97·6° and 100° F. A hospital ship called for patients on April 14, and, as he was then judged to be fit to travel, he was evacuated to the mainland on that date.

The progress of this soldier after leaving Bougainville is contained in the description which appears below.

He was admitted to a base hospital in Sydney on April 23, 1945. On this date, his general condition was so poor that once again he was placed on the "dangerously ill" list. A

blood examination carried out on April 23 gave the following results: the red blood cells numbered 2,200,000 per cubic millimetre, the hæmoglobin value was 6·9 grammes per 100 millilitres and the white blood cells numbered 10,000 per cubic millimetre of which only 1% were eosinophile cells.

The following summary is of his progress until July 3, when he entered the convalescent stage.

Upon his arrival at the base hospital, the patient had a general "toxic" and emaciated appearance. He had minimal signs of bronchitis in his lungs, but these rapidly cleared, not to return. Two X-ray examinations produced no evidence that his lung abscess had left any effect. It was not until early in June that he looked better and his general condition began to improve. During the week prior to July 3 a pronounced general improvement took place. He was eating well, he began to put on weight, and his colour was much improved. It was expected that soon after that date he would be well enough to be returned to his home State, Tasmania, there to convalesce.

After he entered hospital, his temperature varied between 99° and 103° F. until May 17. He was almost afebrile each morning, and his pyrexia was highest late in the afternoon. From May 25 onwards, apart from an occasional rise of temperature to 99° F. he remained afebrile.

For the first month his pulse rate varied between 108 and 120 per minute, after which it remained steady at about 90 per minute.

It has been mentioned that no malarial parasites were found in films examined on Bougainville. In films taken at the base hospital no malarial parasites were found until May 21 when benign tertian parasites were discovered. The routine army course of quinine, "Atebrin" and "Plasmoquine" was given, and whether or not incompletely suppressed malaria was the cause of the intermittent pyrexia, the fact remains that, from the time when anti-malarial therapy was instituted, he remained for all intents and purposes afebrile.

The dark fluid stools, three to five *per diem*, which had been one of the characteristics of his illness on Bougainville, continued to be passed during the first fortnight after his admission to the base hospital. From that time they became less frequent, until during the ten days prior to July 3, only one or two soft, formed or semi-formed stools were being passed each day. Initially, and when the patient was not having iron therapy, the stools, as on Bougainville, were dark. The colour suggested a continuance of the intestinal hæmorrhage, and this was proved to be present, for all tests for occult blood performed on the fæces during the period of his stay in hospital gave positive results.

On June 18 it was noted that his stools appeared bulky and greasy, and examination disclosed an excess of split fat. However, on July 1, the stools, although still slightly greasy in appearance, looked much more normal.

The suggestion that this fatty type of stool was due to defective absorption from the small intestine appears to be correct. Several reports have appeared recently of cases of prolonged bacillary dysentery in which the stools had somewhat the same appearance, and were suggestive of defective digestion in or absorption from the bowel, or of both. In respect of these abnormal stools, it appears that both in the case reported, and in those of chronic bacillary dysentery referred to earlier, there may have been a common *modus operandi*. Intestinal "hurry" may afford an additional explanation to that offered in the cases of dysentery—namely, that sulphaguanidine may have been a factor in the production of a conditioned deficiency, by inhibiting the growth of commensal organisms in the bowel. In any case, the evidence in the fæces of poor absorption affords at least one reason for the great loss of weight that occurred in this patient.

It was noted that, until the middle of June, abdominal distension was a prominent feature, and the physical signs indicated that the small intestine was more the cause of this distension than was the colon. This feature was also observed whilst the patient was on Bougainville. Both there and at the hospital in Sydney for the first three or four weeks after his admission, colicky abdominal pains were one of his chief complaints. The abdominal distension slowly but steadily diminshed, concurrently with the improvement in the stools.

It has been mentioned earlier in the description of this case, that adult forms of *Necator americanus* were recovered from the stools on Bougainville, and that in spite of repeated searches, no other pathogens had been found. Apart from hookworm ova, which were present in all specimens examined until July 3, and which were reported on occasions to be plentiful, no amœbæ, cysts or other pathogens were recovered. Sigmoidoscopy disclosed inflamed mucosa in the rectum and in the lower part of the sigmoid colon, but no ulcers were seen.

It is interesting to record that ova obtained from this patient whilst in the base hospital were incubated, and adult forms of *Ankylostoma duodenale* were produced. Thus it was proved that he had suffered a double infection.

During his stay in hospital on Bougainville, the patient had been given four "drenches" with tetrachlorethylene and oil of chenopodium in combination. After his arrival in Sydney, it was decided, in view of his poor general condition, not to administer any immediate treatment with these drugs, as it was thought that toxic effects might result therefrom. However, on May 10 hexylresorcinol was given, but without any appreciable improvement.

It was not until May 26 that it was thought to be safe to give tetrachlorethylene and oil of chenopodium. This was done then, oil of chenopodium was given again on June 19, and finally on July 3 he was given another combined "drench", all apparently without toxic effects. Thus, this patient, until July 3, had received eight "drenches", and yet hookworm ova were still plentiful in his fæces.

On the suggestion of Dr. G. A. M. Heydon, of the School of Public Health and Tropical Medicine, Sydney, it was proposed to pass a duodenal tube and administer through it one gramme of hexylresorcinol in 1,500 millilitres of water, over a period of several hours. It was thought that by this means any excess of mucus in the small bowel would be likely to be dealt with, and so the hexylresorcinol would be made more effective. Furthermore, as his general condition had improved so much by July 3 it was proposed, if his blood count was satisfactory, to repeat in the near future the combined treatment with tetrachlorethylene and oil of chenopodium.

Until the third week in June, his hæmoglobin value varied between seven and nine grammes per 100 millilitres, the minimum being 5·9 grammes per 100 millilitres on May 19. However, at the end of June the hæmoglobin value began to rise. This rise was assisted by a transfusion of two litres of blood on June 26, and on July 2 it reached 12·5 grammes per 100 millilitres, the highest figure recorded since February 28, which was fourteen days after his admission to hospital on Bougainville. This rise in hæmoglobin value occurred concurrently with the improvement in his general condition which was noticed during the latter part of June and early July.

Four doses of "Anahæmin", varying between four and six millilitres, were given purely as a hæmatopoietic stimulant. In addition, iron and ammonium citrate, up to 90 grains per day, was given, and when, as on Bougainville, it was found that this gave rise to abdominal discomfort, the proprietary preparation "Colliron" was substituted, with benefit.

The reticulocytes varied on different occasions between 3% and 8% of the red cells, indicating that the bone marrow had retained its regenerative powers in spite of the intestinal hæmorrhage, which had continued over a period of approximately four months.

The white blood cell count varied between 10,000 and 18,000 per cubic millimetre, the maximum eosinophilia (39%) being recorded with the latter count on June 19.

During transit to Australia on the hospital ship, the patient received a blood transfusion of three pints. Between April 23 and June 26, he was given a further 11 litres, a total of 46 pints of blood since his illness began.

In addition to the special investigations previously mentioned, the following examinations were performed. Attempted culture of microorganisms from the blood was without result. The hippuric acid liver function test produced a normal result. The serum bilirubin content was normal. The bilharzia complement fixaton test produced negative results. The plasma protein content per 100 millilitres was as follows: on April 23, 4·1 milligrammes; on May 4, 4·4; on May 19, normal. Examination by means of a barium meal and enema was contemplated, but it was decided to delay these investigations until the patient was fully in the convalescent stage.

The clinical record of this patient covers the time when he was first admitted to hospital on Bougainville on February 25, 1945, and period of his stay in a base hospital in Sydney (July 3, 1945). On the latter date there was every reason to believe that his convalescence towards recovery would not be long delayed.

The main features of his illness are as follows: (*a*) the extremely severe and prolonged form of illness from which he suffered; (*b*) the long-continued melena produced by persistent hæmorrhage from the small intestine; (*c*) the occurrence of a lung abscess, which completely resolved; (*d*) the fact that, during a period of five months, it was necessary to give 46 pints of blood by transfusion to tide the patient over his illness; (*e*) the discovery that even after eight "drenches" with vermifuges, hookworm ova were still plentiful in his fæces; (*f*) the double infection with *Necator americanus* and *Ankylostoma duodenale*.

It is thought that the detailed description of this case is warranted by its many interesting and instructive features.

General Discussion.

In the great majority of cases, ankylostomiasis is a relatively mild disease amongst Australian army personnel. In many, the infestation has been a chance finding, the soldier complaining of no symptoms which might be attributed to this infection. Two reasons suggest themselves as an explanation for the mild character of the disease—namely, the absence of repeated infestation of any severity, and the good general nutrition of the men, consequent upon a well-balanced and adequate diet, except during those periods when operational difficulties prevent other than basic rations from being available.

However, a large group of men in whose cases the diagnosis was established were found to be suffering from what might be described, in broad terms, as general ill-health. In these cases the common symptoms were abdominal (and especially epigastric) discomfort, lassitude, anorexia, and the sequelæ of mild to moderate anæmia, such as dyspnœa on exertion or œdema of the ankles.

The third group, consisting of three patients only, presented themselves with an acute form of the disease, the essential feature being severe anæmia of rapid onset. In many respects in these cases the clinical picture resembled that of continued gastro-intestinal hæmorrhage from peptic ulceration, and repeated transfusions were needed to carry them through their illness. In the three acute cases studied, in spite of the obvious explanation—namely, continued intestinal hæmorrhage—it was thought that the anæmia was so persistent that some depression of the red blood cells series in the bone marrow might be occurring to account for the lack of response to treatment. With this in view, sternal marrow puncture was carried out on two of the patients. Findings indicated no lack of maturation and no depression of the erythroblastic series. The degree of anæmia reached in such a short time after primary infection cast a new light on the state of affairs amongst those of us who were relatively inexperienced in this disease. One patient's hæmoglobin value fell to five grammes per 100 millilitres, the red blood cell count being 2,100,000 per cubic millimetre, five weeks after his symptom of "ground" itch. Another arrived at the hospital approximately six weeks after his initial invasive symptom, with a hæmoglobin value of 4·5 grammes per 100 millilitres, and a red blood cell count of only 1,700,000 per cubic millimetre. In one of the cases long-continued intestinal hæmorrhage was an outstanding feature, and in the three acute cases frank melena occurred—an unusual happening in this disease.

The course that the larvæ take within the body, after gaining access through the skin, was clearly demonstrated in some 25 cases, for these patients gave a classical history of the march of the early invasive symptoms—namely, "ground" itch, followed by respiratory symptoms, and then abdominal symptoms. Of especial interest was the occurrence of a lung abscess in one case. In two standard text-books available on tropical diseases, lung abscess is not mentioned as a complication of ankylostomiasis. Apparently not only had the passage of large numbers of larvæ through the lungs in this case given rise to an irritation within the lung parenchyma, which was commonly present in others, but a superadded infection with pyococcal organisms had occurred to the extent of leading to localized and frankly suppurative pneumonitis. The abscess completely resolved.

The extreme degree of eosinophilia which occurred in a few of the cases was interesting. Whitby and Britton, in the fourth edition of their "Disorders of the Blood", state that "an eosinophilia of 90% has been observed in acute cases, the phenomenon taking three to four months to develop from the time of the original infection". In one of the acute cases studied (that of Private N.), the maximum eosinophilia reached was 88%, this figure being recorded approximately four months after the probable date of the primary infection. Perhaps of greater significance were the high total white blood cell count and the absolute number of eosinophile cells in a few of the cases. The maximum figures were 60,000 and 51,000 cells per cubic millimetre respectively; these occurred in one case during the convalescent period, but adult worms (*Necator americanus*) were subsequently proved to be still present. Experience has shown that eosinophilia may last in this disease for four to six weeks and sometimes longer after the worms have been eradicated. If this interval is borne in mind, persistent eosinophilia, when no other cause is apparent, may be taken to indicate the probable continued presence of worms.

A diagnostic pitfall was learnt early, namely, that for some time after primary invasion through the skin—in one case encountered the period was sixty-one days—repeated fæces examinations for hookworm ova are likely to produce negative results, even in the presence of definite abdominal symptoms which would lead one to suspect that the larvæ had attached themselves to the mucous membrane of the upper portion of the small intestine. One explanation obviously lies in the fact that it takes several weeks (in one experimental series fifty-four to fifty-seven days) for the larvæ to develop into adult female worms capable of producing eggs.

Whether or not vermifuges are as effective in dislodging immature worms as they are in dislodging mature worms is not known. But the experience at this hospital would suggest that such is not the case, for the recovery after a "drench" of worms from several patients soon after the onset of their abdominal symptoms, and from two when obvious intestinal hæmorrhage was occurring, was either very disappointing or entirely non-existent. The explanation of this is not clear. The practice adopted was to give vermifuges as soon as the diagnosis was established or presumed on strong clinical evidence. In any case, the experience of authorities has shown that the most certain way of establishing the diagnosis in this disease is by the recovery of worms after the administration of vermifuges, and not by waiting for the appearance of ova.

In recent years, reports have been appearing of cases of Wiengarten's syndrome or tropical eosinophilia, in which the condition has responded to the administration of a few doses of arsenicals such as "Novarsenobillon" or "Mapharsen". The ætiology of this condition is at present obscure. But it has been suggested that the respiratory symptoms and signs in this syndrome, and the eosinophilia, may have a basis in some acarine or other parasitic infection. If such is the case, and if an analogy may be drawn with ankylostomiasis, then it may be reasonable to administer arsenicals to patients during the period when the early invasive symptoms of this disease, particularly the respiratory symptoms, are occurring. As the opportunity presents itself, it is intended to put this theory to the test, given though it may be on empirical grounds.

Summary.

1. Experiences with hookworm disease occurring amongst Australian army personnel in New Guinea and on Bougainville, Solomon Islands, are recorded.

2. The mild nature of the infection in the great majority of cases is stressed.

3. Descriptions of three acute cases are given, each resulting in severe anæmia of rapid onset, and being accompanied by melena. Two were due to infection with *Necator americanus*, the remaining case being due to a double infection with *Necator americanus* and *Ankylostoma duodenale*. In one of these cases a lung abscess developed,

and the patient had a prolonged and serious illness. Another patient was proved to have heavy infestation of approximately 3,500 worms.

4. A group of cases demonstrating the classical early invasive symptoms occurring in their chronological order is described.

5. The almost invariably good response to tetrachlorethylene and oil of chenopodium given in combination is demonstrated.

6. Some pitfalls in early diagnosis in this disease are discussed, and the extremely high degree of eosinophilia that occurred in several of the cases is recorded.

7. It is suggested that hookworm disease should be borne in mind by civil medical practitioners treating discharged service personnel after this war, especially those who may present themselves with anæmia of indefinite ætiology, ill-defined abdominal symptoms, or vague, general impairment of health.

ACKNOWLEDGEMENTS.

It is with thanks that acknowledgement is made to the members of the medical division of the Australian general hospital at which this work was carried out for their cooperation and help in compiling the clinical notes. In addition, Major V. J. McGovern, pathologist attached to the hospital, and his laboratory staff were of much assistance by their painstaking work, particularly with regard to the many blood examinations performed. My thanks are also due to Lieutenant-Colonel Bruce Hall, O.C., medical division of an Australian base hospital, for the detailed notes he kindly supplied of the progress of one of the patients whilst in hospital on the mainland.

The Director-General of Medical Services has given permission for the publication of this paper.

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SOME OBSERVATIONS CONCERNING THE USE OF HYPNOSIS AS A SUBSTITUTE FOR ANÆSTHESIA.

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THE present article is not intended as a general discussion of the use of hypnosis in surgery, nor does it record any important new discovery, for the possibility of performing certain operations under hypnosis has been known since the pre-Listerian era. It is simply an account of certain observations made in rather unusual circumstances and of a kind probably unfamiliar to the majority of British and Australian surgeons.

The cases described were all encountered at a prisoner of war hospital established at River Valley Road, Singapore, from April 12 till August 20, 1945. The hospital received patients from three working camps, and was expected to accommodate up to 150 patients and to provide all necessary medical and surgical treatment, since in no circumstances was evacuation to the main prisoner of war hospitals at Changi or Kranji allowed.

Conditions were primitive in the extreme; there were no proper beds, no mattresses or sheets and no bed pans or urine bottles, and wards and operating theatre consisted of wooden huts with *atap* roofs and mud floors. When the first surgical patient—a man suffering from perforated peptic ulcer—was admitted, the hospital possessed no instruments and no anæsthetics of any kind. However, after some six hours' delay the Japanese produced a reasonable set of instruments, and these, with odd pieces of linen to serve as drapes, we were able to sterilize in a native boiler over an open fire. About four ounces of chloroform were also provided for this first case, and thereafter we received a few ounces from time to time; by exercising considerable care we even managed to build up a small stock, but at no time did this exceed one pound. We were also given a little "Novocain", a few ampoules of spinal anæsthetic agent and one tube of ethyl chloride; but as during our first week we had four major and a number of minor operations, including dental extractions, and as further it appeared probable that we might have to cope at any moment with a considerable number of casualties, occasioned either by air raids or by the tunnelling work on which the working parties were employed, the anæsthetic situation caused us grave anxiety. It was on this account that it was decided to attempt to use hypnosis, instead of the more usual forms of anæsthesia, in selected cases.

It will be seen that the patients described below were for the most part suffering from comparatively minor ailments; but this does not imply that the method was considered unsuitable for major surgery. It was, however, thought wiser to begin with simple cases, and the sudden cessation of hostilities brought our investigations to an abrupt termination before we had progressed very far. Furthermore, it was found desirable to make at least one preliminary induction of hypnosis prior to that under which the operation was to be performed, and most of our major surgery was concerned with acute abdominal emergencies in which no delay was permissible.

Technique Employed.

Hypnosis was induced with the patient lying supine on a table. The method employed was that of convergence fatigue, the patient being instructed to fix his gaze upon the point of a pencil held at the minimum distance of distinct vision. Suggestions were made by word of mouth, and once the patient was soundly asleep these were primarily concerned with the production of anæsthesia, first in the arm to allow a test to be made with a sharp needle, and then in the field of operation. It was also suggested to the patient that he would experience no post-operative pain, that he would have a good night's sleep following the operation, and that he would remember nothing of what had been said to him or had happened to him during the time he was in a hypnotic state. In addition, in the case of patients exhibiting such symptoms as headache, nervousness, insomnia (a common complaint of prisoners of war) *et cetera*, appropriate suggestions were made to deal with these conditions. After the operation was over and all these suggestions had been made, the patient was left sleeping for about ten minutes and then slowly awakened.

As has been mentioned in the introduction, it was found advantageous to induce hypnosis on at least one occasion prior to operation, and this practice was followed in the great majority of cases. In two cases in which the attempt to induce true hypnosis failed, the mere suggestion of anæsthesia enabled the operation to be performed. One of these was surgical (Case II), the other dental (extraction of a lower incisor), and this latter was remarkable in that, after the extraction, the patient reported a feeling of stiffness and numbness in his jaw and lips such as normally follows the use of a local anæsthetic agent. As a result of these cases two other patients were anæsthetized by suggestion only, without any attempt to induce true hypnosis, and both had teeth removed painlessly.

Difficulties and Failures.

A general analysis of cases is given in Table I.

It was found that it was easier to induce hypnosis in reasonably intelligent patients than in mental defectives; but beyond this no general principle could be discovered which would enable one to decide in advance whether a given patient was likely to be easily hypnotized or not. In particular, as the table shows, there was no significant difference in this respect between patients of different races—a fact which was surprising, in view of the

TABLE I.

Degree of Hypnosis.	Nationality.				Total.
	Australian.	British.	Dutch.	Eurasian.	
Deep sleep	3	4	7	6	20
Superficial sleep	1	—	2	1	4
Hypnosis attempted without success	1	—	—	2	3
Suggestion anæsthesia only; no attempt at true hypnosis	1	1	—	—	2
Grand total	.. ..	.. ..	.. ..	.. ..	29

scepticism expressed by many of the British and Australian troops when they first heard that hypnosis was being used.

The condition described as superficial sleep, though adequate for many psychiatric purposes, was unsuitable for surgery except in the case of very minor procedures. Failure to induce hypnosis of the degree desired for surgical purposes was sometimes inexplicable; but in three cases the reason for the failure seemed fairly clear. Two of these patients suffered from eye disturbances; one (surgical Case II) was a hypermetrope whose minimum distance of distinct vision was about one yard, and the hypnotist accidentally allowed his head to come between the eyes of the patient and the pencil point during the induction stage; the other was asthenopic and could not keep his eyes fixed upon the point. The third patient suffered from deafness, which was not recognized at the time; consequently he did not hear many of the suggestions made to him.

Post-operative pain was rare and amnesia was usually complete; the exceptions are noted below, but in general it may be stated that they were due either to omission of the appropriate suggestions or to waking the patient too soon (that is, less than ten minutes) after the final suggestions had been made.

Reports of Cases.

Dental Cases.

In all there were 23 patients on whom dental extractions were performed. These were not specially selected, and many of them had several teeth extracted during one session. Thus, for example, in one case a lower third molar, an upper molar and a lower premolar were removed. In every instance the cooperation of the patient was freely employed; thus, once sleep was induced, the patient was told to sit up, to open his mouth, to rinse, to spit and so on, and such orders given by the hypnotist were always promptly obeyed.

On being awakened, almost every patient expressed surprise at finding himself in the operating theatre (we used the same room for surgical and dental cases) and refused to believe that a tooth had been removed until he located the gap with his tongue. In only two of the cases was there any post-operative pain. One of these patients suffered from a dry socket. The other case was of particular interest, in that the pain almost certainly resulted from the fact that the usual post-operative suggestions had been omitted. This occurred because after the extraction there was a considerable discharge of pus from the alveolus, and it was considered advisable to awaken the patient quickly because of the risk of inhalation. This patient had been in no pain when he first woke up; but about three-quarters of an hour later severe pain suddenly commenced, continued for about five minutes, and then as suddenly diminished. It did not disappear completely, however, but remained for some hours at about the same intensity as normally occurs after dental extraction. A possible explanation of the severe pain of short duration would seem to be that the patient mentally relived the period of extraction as a result of the omission of the suggestion of amnesia; the subsequent mild pain must, of course, be attributed to the omission of the suggestion of painless recovery.

Surgical Cases.

CASE I.—Private A.S., an Australian, aged thirty-four years, had painful ingrowing toenails which had resisted all previous treatment, and it was decided to perform partial amputation of the terminal phalanx with complete removal of the nail and nail bed. Hypnosis was successfully induced at a preliminary session; the patient was in a deep sleep and lost all power and sensation in his limbs. On the following day an attempt was made to induce hypnosis again with a view to operation. On this occasion, however, the patient was nervous and excitable, his sleep was only superficial, and he complained of pain when the incision was made, so eventually we had to resort to using local anæsthesia.

This case must therefore be reckoned a failure, but it was noteworthy that there was complete absence of post-operative pain, and this we attribute partly to the fact that it was suggested to the patient while superficially asleep that he would experience no further pain in the toe.

CASE II.—Sergeant H., a Dutch Eurasian, aged forty years, was admitted to hospital suffering from septicæmia and cellulitis of the leg consequent on an infected laceration. The septicæmia was controlled with sulphadiazine, and it then became necessary to evacuate a localized collection of pus in the cellular tissues over the left tibia. This was done under ethyl chloride anæsthesia; but drainage was inadequate, and one week later, after the usual preliminary session, an attempt was made to hypnotize the patient for the purpose of further operation. Owing to a technical error referred to previously, hypnosis was not completely successful; but a state of superficial sleep was induced which proved sufficient to allow an incision over two inches long to be made and the abscess cavity explored. The patient complained of a little pain during the operation, but subsequently the leg was completely free from pain, and recovery was uneventful.

CASE III.—Private R.C., a Dutch Eurasian, aged forty years, was admitted to hospital with an infected laceration of the right index finger of six days' duration. On examination of the patient, a wound half an inch long and discharging thick pus was seen over the flexor aspect of the middle phalanx; the finger was extremely swollen and the dorsum of the hand œdematous, and severe pain was felt on flexion of the finger, together with tenderness over the limits of the flexor tendon sheath. The patient's temperature was 101° F. and his pulse rate 100 per minute. A diagnosis of suppurative tenosynovitis was made, and after a preliminary session operation was undertaken the same day under hypnosis. The patient was put into a deep sleep and the whole upper extremity was rendered anæsthetic. A tourniquet was applied to the upper part of the arm, and hand and arm were supported on a small table. The hand was held with the thumb somewhat opposed and the third and fourth fingers partly flexed; but on being ordered by the hypnotist to do so, the patient immediately straightened his fingers and abducted his thumb, thus giving adequate access to the index finger and rendering it unnecessary for the hand to be held by an assistant. The original wound was explored and found to extend down to the flexor tendon sheath, but the latter did not appear to contain pus. An incision was then made over the proximal phalanx, and pus was evacuated from the cellular tissues of the finger; again the tendon sheath was clearly seen, but as it did not contain pus it was left severely alone. The whole operation lasted about twenty minutes, and during this time the patient did not appear to experience any pain, nor did he move his hand except as ordered by the hypnotist. He was told while still asleep that he would not experience any more pain in the finger and that he would remember nothing of the operation. On being awakened he expressed surprise at finding himself in the operating theatre; he had no idea that his hand had

been operated on, but remarked that it was no longer painful. On returning to the ward he fell asleep almost immediately. Three days later another incision had to be made, this time on the dorsum of the finger, and through drainage was established. Once again hypnosis was used with complete success, and it was also used on the following day when the drain was removed. Recovery was uneventful, and it appears that the patient will be left with a reasonably mobile finger.

The most striking feature of this case was the complete absence of post-operative pain despite the severity of the inflammation. At no period during the post-operative period was morphine or any other hypnotic drug required.

CASE IV.—Sergeant W.H., British, aged thirty-two years, had a paronychia necessitating simple avulsion of a finger nail. Hypnosis was induced on the day prior to that intended for operation, but his sleep was so sound that the nail was removed forthwith. Once again the cooperation of the patient was perfect, the operation was painless and there was no opst-operative pain.

CASE V.—Private S., a Dutch Eurasian, aged twenty-eight years, received a blow on the dorsum of the hand from a sledge hammer, and fracture of the metacarpus was suspected; but there was so much swelling and he complained of so much pain that adequate clinical examination was impossible; so, since X-ray examination was unobtainable, an accurate diagnosis could not be made. Next day the swelling had subsided somewhat, but the patient still did not tolerate examination well; hypnosis was therefore induced, and it was then easy to demonstrate that no fracture was present. While still asleep the patient was told that the hand would not be painful any more, and on being awakened he not only no longer complained of pain, but was perfectly willing to allow the hand to be examined.

The sixth subject was Staff Sergeant W., an Australian, aged thirty-six years, who was used as a test subject. Hypnosis was induced for purely psychiatric reasons, in order to determine what degree of relaxation of the abdominal muscles and of the anal sphincter could be obtained. With regard to the former, it was found that the relaxation under hypnosis was considerably greater than that obtained with the voluntary cooperation of the same patient when awake, but not so great as that normally obtained under ordinary surgical anæsthesia. With regard to the latter, it was found easy to make the patient bear down and go through the motions of defæcation; but relaxation of the sphincter to the degree required for operations such as hæmorrhoidectomy was not obtained. This failure was probably due, at any rate in part, to the difficulty of conveying to the mind of the patient exactly what was required of him.

Summary and Conclusions.

1. An account is given of some 29 cases illustrating the use of hypnosis as a substitute for anæsthesia.

2. The use of hypnosis in these cases was necessitated by rather unusual circumstances, which one may reasonably hope never to encounter again; but the method was found to possess certain advantages which may justify its use in selected cases in ordinary surgical practice. The advantages referred to are as follows: (i) Nervousness of the patient is entirely eliminated. (ii) Full cooperation of the patient can be secured. (iii) Post-operative pain can be reduced to a minimum, and even in many cases prevented altogether. (iv) The usual complications of other forms of anæsthesia, including post-operative vomiting, do not occur. (v) It appears that in dental cases in which hypnosis is used there may be less hæmorrhage and more rapid healing of the wound than normally occur when other methods are used. (vi) The method may be used in certain cases in which ordinary anæsthetics are contraindicated or cannot easily be employed—for instance, for patients requiring dental extraction in whom pronounced trismus renders the use of local anæsthetics difficult, and when for some reason or other general anæsthesia is contraindicated.

3. The method appears to be safe and reliable, and in particular, once a satisfactory state of hypnosis is induced, the possibility of the patient's waking prematurely during the operation is remote. There is, of course, the risk that by the abolition of post-operative pain complications which supervene may pass unrecognized; but once this possibility is realized the danger is thereby reduced to a minimum.

4. The present investigation unfortunately (or fortunately) did not go very far; but the results obtained at least indicate some of the possible surgical applications of hypnosis, and suggest that further work done along similar lines might lead to results of considerable value. Such work, if it is to be successful, must be undertaken by a surgeon and a psychiatrist working in collaboration.

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THE ANTI-O AGGLUTININ IN HUMAN BLOOD, WITH THE REPORT OF A CASE OF ITS OCCURRENCE.

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THE normal iso-agglutinins α and β found in normal human serum are familiar to everyone. However, other agglutinins, both normal iso-agglutinins and immune iso-agglutinins, are present in human serum; these are not so well known, primarily because of their rarity, and also because they are more difficult to demonstrate. Some of these are set out and explained in compact tables by Boyd[14] and also in War Memorandum Number 9 of the Medical Research Council.[13] The role of the agglutinogens A and B in transfusions is too well known to discuss here, but the role of the O agglutinogen is not so well known. For a considerable time the "O" was assumed to imply absence of agglutinogens, but it is now known that the O factor is a definite and demonstrable antigen.

Naturally occurring agglutinins for the M and N factors are rare. Wiener[1] reports five cases in which normal anti-M agglutinins were present, and two cases in which immune anti-M agglutinins were present.[2] To the best of my knowledge no cases in which naturally occurring anti-N agglutinins were present have been reported, and to date only one rather unconvincing report[7] of immune anti-N agglutinins has been published. Certain specimens of normal serum, however, contain atypical iso-agglutinins, among which may be mentioned the anti-P^1 agglutinin (extra agglutinin I) and the anti-O (or, as it is sometimes unfortunately called, α_2) agglutinin. These atypical agglutinins are usually cold agglutinins—that is, they act more intensely at low temperatures and are only rarely active at 37° C. They are usually of low potency, and the reactions normally are much weaker than the ordinary ABO reactions.

The case to be described relates to the anti-O agglutinin. The anti-O agglutinin is an atypical cold agglutinin, which is found most frequently in blood of group A_1B. It also occurs in group A_1 blood and in a few specimens of group B blood. Thomsen[5] has postulated that the serum detects a special agglutinogen O determined by a corresponding gene O. The variable reactions with group A and group B blood were attributed to heterozygosity, and the weakness of the reactions to the partial dominance of genes A and B over gene O. Because it was found to produce agglutination in blood of subgroup A_2, but not in blood of subgroup A_1, it was thought to be related to the qualitative differences in these subgroups, and was called the α_2 agglutinin. However, it was found to produce intense agglutination in group O blood and weak or no agglutination in group A_2B blood, and, as Wiener and Karowe[4] have recently pointed out in a most interesting paper, this led to the opinion that the reactions must be due to a special agglutinogen O, which was a basal substance present in all cells. Of two other postulates described by Wiener and Karowe,[4] the first, by Hirzfeld,[6] was that this antibody

[1] The recent report by Wiener and Unger[12] of a case of iso-immunization by factor P summarizes the knowledge of this factor.

is a human species agglutinin, the varying avidities of the serum for different cells being due to the amount of species antigen on the cell surface, group O cells containing all species antigen, while A and B antigens displaced or suppressed some of the surface antigen in blood of the other groups. The second postulate, by Dockeray and Sachs,[7] was that it was a special sort of autoagglutinin. On the other hand, the saliva of persons of all blood groups (the secretors, of course), which contains the respective agglutinogens, combines with anti-O serum and neutralizes the agglutinin: this indicates that the O antigen is a part of the antigenic pattern of all groups.[8]

Matta[10] has made a detailed study of the O agglutinogen, using immune anti-O serum prepared by immunizing goats and rabbits with group O blood. He does not agree that O is a species agglutinogen, because, if this were so, it should be possible to absorb anti-O serum by cells of all groups. He proved that certain types of AB, A and B cells were not able to absorb the anti-O agglutinin even when the serum was diluted or when the attempt at absorption was repeated. Also, if O were a species agglutinogen, and were suppressed by A and B agglutinogens to varying degrees, then anti-human serum should agglutinate group O cells to a higher titre than the cells of blood of other groups, particularly group AB. Matta, using six different samples of anti-human serum prepared with group O cells, found that AB cells were agglutinated to practically the same extent as group O cells. Matta, then, is of the opinion that the O antigen is a specific agglutinogen for O cells.

As has been mentioned above, the atypical agglutinins are rare, and usually the reactions are weak, so that the case to be described, in which the patient's blood contained a relatively potent anti-O agglutinin, will be of interest.

Report of a Case.

Mrs. E.R., aged thirty-three years, was referred to me in March, 1944, for determination of the Rh type of her blood. Her first pregnancy had resulted, in June, 1941, in a normal male infant, who is alive and well. Her second child was a female, born in March, 1943; the infant was three and a half weeks premature and was jaundiced when born. This infant received her first blood transfusion from her father when she was three weeks old. Two days later she received another transfusion from an unknown donor, and died the same day. Unfortunately, no blood studies of this infant are available. The patient, when referred to me in March, 1944, was in the eighth month of her third pregnancy. Her blood proved to belong to group AB Rh+, and that of her husband to group O Rh−. Moreover, her serum contained an atypical antibody. I immediately began to think of anti-Hr serum, but a few tests on cells of known types soon dispelled this idea. The antibody proved to be a "cold agglutinin" which acted intensely on all specimens of group O blood and on some specimens of group A blood irrespective of their Rh type. It was without action on a few specimens of group AB blood I tested.

The titre of the cold agglutinin against group OMN Rh+ cells was determined by serial dilutions in small test tubes and was found to be 32 at 4° C. and 16 at room temperature, while at 37° C. it was still active with a titre of 2·0. The following results (Table I) were obtained when the serum was mixed with an equal volume of a 3% suspension of the respective cells, taken at random, and read after the mixture had stood for two hours at 4° C. and had been centrifuged.

Table I

Reactions of the Antibody with Cells of Known Groups.

Group of Cells.	Result.	Group of Cells.	Result.
A Rh+	++	B Rh+	+
A_1MN Rh+	++++	O Rh+	++++
A_1MN Rh+	±	A	−
O Rh+	++++	O	++++
A Rh−	−	A	tr.
BM Rh+	+	O	++++
A_1M Rh+	+++	A	+++
A_1BMN Rh−	−	A	tr.
OM Rh+	++++	O Rh+	++++
OMN Rh+	++++	O Rh−	++++
O Rh−	++++	A Rh−	+++

With these results in mind, and as the patient lived in the country, I reported to the obstetrician as follows:

> The patient belongs to group AB Rh+. Her serum contains an irregular agglutinin most active at 4° C., but also active at 37° C., which has the specificity of an anti-O agglutinin. This is unrelated to fœtal immunization. However, it is imperative that the patient be not transfused with group O blood with which she is strongly incompatible. A group A_1B donor is most suitable for her. The husband belongs to group ORh−.

The patient was admitted to the Brisbane Women's Hospital in premature labour on March 29, 1944, and a male infant was born the same day. The child's hæmoglobin value on the same date was 165% (Haldane) and his blood group B Rh+. On the fourth day of life the child became mildly jaundiced, but was discharged from hospital without treatment on the fourteenth day with a hæmoglobin value of 110%. The hæmoglobin value dropped alarmingly, however, and on the twenty-first day of the child's life the value was only 60%. The infant received his first transfusion the same day from a donor of group B Rh+. His hæmoglobin value rose by 25% as a result, and he progressed slowly; but by the age of about four months he was quite well, and remains so. The results of investigations of the hæmoglobin value are shown in Table II.

Table II.

Progressive Hæmoglobin Values in the Case of Baby R.

Date.	Hæmoglobin Value. (Percentage.)	Date.	Hæmoglobin Value. (Percentage.)
March 29	165	April 19[1]	
March 31	135	April 20	85
April 1	140	April 22	78
April 3	110	April 24	78
April 5	120	April 27	80
April 11	110	May 3	75
April 18	60	May 8	65

[1] Blood transfusion.

Unfortunately no other blood studies were carried out. A further sample of blood was taken from the mother on April 20, 1944, and it still contained the antibody of the same specificity and thermal pattern with the following titres against the same group OMN Rh+ cells: at 4° C. the titre was 16, at room temperature (22° C.) 8·0, and at 37° C., 4·0; these results are the same as the earlier results, within the limits of experimental error. The mother's serum taken before and after parturition strongly agglutinated the baby's cells ("+++" at 4° C. and "++" at 37° C.).

From the results of the above tests on known cells, as well as the titre against group O cells, it seemed evident that I was dealing with an anti-O agglutinin. In view of the family history, it was interesting now to know whether the agglutinin was an immune agglutinin resulting from the pregnancies. The first child belonged to blood group A and the third child (the present infant) to blood group B. The blood group of the second infant remains unknown. It is obvious that with the mating of a woman of blood group AB and a man of blood group O, all offspring must belong to either blood group A or blood group B, and, moreover, must be heterozygous. Therefore the genotype of the first child must be AO and that of the third child BO. Could the O gene in these heterozygous types of blood immunize the mother? For this to be possible, obviously the mother must lack the agglutinogen O (and also A_2) from her genetic composition. In other words, she must belong to subgroup A_1B. Major R. J. Walsh, of the Blood and Serum Preparation Unit, Sydney, settled this matter for me, at the same time as he kindly allotted the individual members of the family into their Hr types to exclude all possibility of the Hr factor's being involved. His results are as follows:

Father ..... O Rh− Hr+
Mother ..... A_1B Rh+ Hr+
First child ..... A_1 Rh+ Hr+
Second child ..... B Rh+ Hr+

The mother's serum agglutinated Hr− cells as well as Rh− cells. These results, of course, rule out the Hr factor, and also establish the mother's blood as of subgroup A_1B.

Experimental Investigation.

In view of the unusual potency of this serum and the fact that it was active at 37° C., ten millilitres of the second specimen were dried and sent to Dr. A. S. Wiener, of New York. He generously examined the serum and obtained some interesting results, which will be shown in the following tables. Table III shows the results of titrations of the serum against cells of different groups. This

TABLE III.
Thermal Range of the Anti-O Agglutinin.

Temperature.	Titre (in Units) Against Cells as Under.				
	O	A_2	A_1	B	A_1B
4° C.	6	6	2	2[1]	0
Room ..	3	3	1	1	0
37° C.	1·5	1·5	0	0	0

[1] Group B cells from one other individual gave a titre of 0.

table graphically depicts the thermal range of the antibody and gives some idea of its specificity. However, the specificity of the antibody is best illustrated in Table IV.

These findings amply confirm the random results given in Table I and demonstrate in clear fashion the marked avidity of the anti-O serum for O and A_2 cells. As has been mentioned before, most anti-O serum is of low potency,

TABLE IV.
Specificity of the Anti-O Agglutinin.

Group of Cells.	Number Tested.	Strength of Agglutination.			
		++++	++	±	−
O	24	24	0	0	0
A_2	2	2	0	0	0
A_1	10	0	8	1	1
B	8	0	7	0	1
A_1B	2	0	0	0	2
A_2B	1	0	1	0	0

and consistent results are obtained only with O and A_2 cells. However, this particular anti-O serum was of sufficient potency to yield satisfactory experimental evidence in support of Wiener's theory that if anti-O serum reacted with those properties determined by genes O and A_2, but not with those determined by A_1 or B, then the only blood which would fail to react would be that of genotype A_1B, that of genotype A_1A_1 and that of genotype BB if the serum were of sufficient potency.

From Table IV it is seen that the serum reacts strongly with blood of group O (genotype OO) and group A_2 (genotypes A_2A_2 and A_2O). Of ten specimens of group A_1 blood, eight reacted moderately (probable genotype A_1O), one weakly (genotype A_1A_2) and one not at all (genotype A_1A_1). Similarly, of eight specimens of group B blood, seven reacted moderately (genotype BO) and one not at all (genotype BB). The two specimens of A_1B blood failed to react, and the A_2B specimen reacted moderately. It will be remembered that the mother's serum reacted strongly with the blood of the infant (genotype BO). The following excellent table (Table V) from Wiener's paper[8] summarizes the situation succinctly.

Matta,[10] using his anti-O rabbit-immune serum, obtained results closely comparable with those shown in Table IV of this paper. He also postulated a new genetic theory of inheritance of the blood groups based on four genes instead of two, subdividing group B into two subgroups B_1

TABLE V.
(*After* Wiener.[8])
Reactions of Anti-O Serum with Blood of the Various Groups.

Group of Blood.	Reactions with Antiserum.				Reactions with Anti-O Serum.
	Anti-A.	Anti-A_1.	Anti-B.	Genotype.	
O	−	−	−	OO	Strong.
A_1	+	+	−	A_1A_1 A_1A_2 A_1O	None. Weak.
A_2	+	−	−	A_2A_2 A_2O	Strong.
B	−	−	+	BB BO	None. Weak.
A_1B	+	+	+	A_1B	None.
A_2B	+	−	+	A_2B	Weak.

and B_2, and group AB therefore into four subgroups A_1B_1, A_1B_2, A_2B_1 and A_2B_2. This, however, has not been confirmed by other workers.

Matta's table is reproduced below (Table VI) and should be compared with Table IV.

TABLE VI.
(*After* Matta.[10])
Action of Purified Immune Anti-O Serum on Cells of Different Types.

Group of Cells.	Sub-group of Cells.	Number Tested.	Strength of Agglutination.			
			++++	++	+	−
O		50	50	0	0	0
A	A_2	12	12	0	0	0
	A_1	24	0	12	7	5
B	B_2	6	6	0	0	0
	B_1	21	0	12	5	4
AB	A_1B_1	9	0	0	0	9
	A_1B_2	12	0	0	12	0
	A_2B_1	3	0	0	3	0
	A_2B_2	3	0	3	0	0

From Tables IV and VI it can be seen that the anti-O serum gives reactions of different strengths according to the "gene dose". This statement is clear after examination of the last two columns of Table V, which show the varying intensities of reaction for the different genotypes. As Wiener[8][11] has pointed out, the Hr factor bears a similar relationship to the Rh blood types as the O agglutinogen does to the ABO blood groups. The table given in the paper by Wiener, Davidsohn and Potter[11] bears a striking resemblance to Table V of this paper, and shows the reaction strengths of anti-Hr serum with blood of the 21 Rh genotypes.

Discussion.

It cannot be definitely determined whether the anti-O agglutinin in the present case is a natural or an immune agglutinin. The relatively high titre of the agglutinin and the fact that it is active at 37° C. are points in favour of its immune nature, but obviously are not conclusive evidence. On the other hand, a sample of serum withdrawn in April, 1945 (twelve months after parturition), showed approximately the same titres (sixteen at 4° C., eight at room temperature and two at 37° C.) as previous specimens; this is evidence against this antibody's being the result of immunization, since the titre usually decreases when the immunizing stimulus is withdrawn.

In this connexion it is of interest to note that at least one case has been reported[12] in which a patient of blood

group A,B was apparently immunized against the O antigen—in this case by transfusion of group O blood—and possessed an anti-O agglutinin. Again the immunization could not be definitely proved.

Although these cases are rare, they serve to prove that the "universal" donor does not exist. The usual objections to the use of the universal donor are on the grounds of high iso-agglutinin titres, and it is not universally agreed that the donor's serum can significantly affect the recipient's cells. It is, however, obvious that here the so-called universal donor's cells would be attacked by the patient's serum; so we have a major incompatibility, and a transfusion from a "universal" donor would probably result in a severe, if not fatal, hæmolytic reaction.

Summary.

A case is reported of a patient whose serum contained an anti-O agglutinin of unusual strength. Its place in the ABO blood group scheme and the possibility of its immune origin are both discussed.

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CHONDRITIS OF THE PATELLA.

By Norman Little and Carlyle Hudson,
Sydney.

Chondritis of the patella has been described by West as chondromalacia and by Cox as traumatic osteochondritis of the patella. The lesion, which has only recently been described in the literature, was first recognized by one of us over seven years ago, and since then many examples have been seen and treated.

In our experience the condition is not uncommon, but it is not widely recognized; yet it is a clinical entity with characteristic symptoms and signs. It is of importance, because it simulates derangements of the menisci, and we know of many patients affected by the condition who have undergone a meniscectomy, only to continue having their symptoms after operation. Chondritis of the patella is a lesion of an area of articular cartilage and probably results from trauma; it is found typically in the infero-medial quadrant, and is characterized by thickening, softening and irregularity of the articular cartilage. The appearance is similar to that produced by *osteochondritis dissecans* of the medial femoral condyle, but so far we have found no involvement of the underlying bone. We consider the condition to be primarily a disease of the cartilage due to contusion and interference with the blood supply. On the other hand, Cox maintains that the true pathological change is to be found in the underlying cancellous bone, and that the change in the articular cartilage is entirely secondary.

Clinical Features.

There is usually a history of a fall onto the knee or a blow on the front of the patella. The accident is followed by acute synovitis, which, however, soon subsides. The subsequent history is one of chronic disability. The chief complaint then is of aching in the front of the knee after prolonged sitting with the knee flexed. The patient usually states that he cannot sit for long at the cinema or in a tram without pain, and that he obtains relief by straightening the knee and altering his position. There is frequently a complaint of clicking or grating behind the patella, but neither true locking nor the sensation of something slipping out of place ever occurs. The most outstanding feature in the collective histories of our patients is the ache in the knee after prolonged sitting. Whenever mention of this symptom is volunteered, one must suspect chondritis of the patella and examine the knee for evidence.

The examination is best conducted with the patient supine and the knee extended. Localized tenderness can be detected on the articular surface of the infero-medial quadrant of the patella by displacing the latter medially and applying digital pressure to the accessible part of the articular cartilage towards the lower pole. Pain is also felt in this situation when the patella is pressed against the femur, while painful post-patellar grating can be elicited in the same situation on movement of the patella against the femur in a vertical direction. Flexion is usually limited by pain over the front of the joint, but the other movements of the knee are full and painless. There is some wasting of the quadriceps muscle; it is, however, not so pronounced as in lesions of the meniscus. A slight effusion usually occurs after exercise, but a large effusion is never seen.

The X-ray examination gives negative results unless the condition is of long standing, when there may be evidence of patello-femoral osteoarthritis. The appearances typical of *osteoarthritis dissecans* have not been seen by us.

Treatment.

Mild and early patellar chondritis responds to counter-irritation, which it may be necessary to continue for several months. It is our usual practice to use Scott's dressing, leaving sufficient periods between applications to avoid untoward skin reactions.

Another useful application is *Unguentum Hydrargyri Iodidi Rubri*. The best method of using this is to rub an amount the size of a pea over the front of the knee and then to apply heat until a sensation of stinging is produced, when a further light application of the ointment is made. This procedure is carried out each day for ten days and then repeated after an interval of seven days, if the patient's skin will tolerate it. If the condition is of long standing and fails to respond to a fair trial of conservative treatment, operation is indicated. We usually review the case after three weeks' treatment with counter-

irritation, and if no improvement has occurred operation is advised; but, if improvement has taken place, the treatment is continued.

When operation is considered necessary, the joint is opened by a medial parapatellar incision. The patella is tilted round its sagittal plane, so that the articular surface can be visualized, and then the involved area of cartilage is shaved off with a sharp scalpel. The affected articular cartilage has a dull, yellowish tinge; it is roughened and has a rubbery consistency, when felt with forceps. The adjacent synovial membrane is frequently thickened and hyperæmic, while pannus formation at the edge of the articular cartilage is sometimes seen. As a rule these changes are confined to the infero-medial quadrant of the articular surface of the bone; but in some cases they are present over a much larger area. We believe that if more than a third of the area of the articular cartilage is the seat of chondritis, the patella should be removed, and the same procedure is necessary if the classical symptoms of the condition are associated with patello-femoral osteoarthritis. Fortunately, most of the patients whom we have treated have not needed excision of the patella, and they have lost their symptoms after chondrectomy.

We employ the same post-operative treatment after chondrectomy of the patella as we do after meniscectomy; early contraction of the quadriceps and early active movements are encouraged.

Prognosis.

Conservative treatment with counter-irritation is successful only in the early mild cases; symptoms are relieved by excision of the affected articular cartilage in the great majority of cases. So far it has been necessary to remove the patella in one case only; although the patient is free of pain, he complains of weakness of the knee. It remains to be seen in how many of these knees osteoarthritis will develop later.

Comment.

We have encountered patients suffering from both chondritis of the patella and a tear of the medial meniscus. To make the diagnosis of the former in such cases is most important, as the treatment of both conditions can be carried out through the same incision.

Chondritis of the patella can be readily recognized by its characteristic signs and symptoms. If it were more widely recognized and treated, many knees would be spared the early onset of osteoarthritis, and the occasional unnecessary and fruitless meniscectomy would be avoided.

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TREATMENT OF SUPPURATIVE TENOSYNOVITIS IN THE FINGERS.

By L. IAN BURT,

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TREATMENT of suppurative tenosynovitis in the fingers by the local application of penicillin has produced such good results that I believe that attention should be drawn to this method. The principle can be extended to include ulnar and radial bursitis and infection of the spaces of the hand.

In the first attempts to deal with these conditions the tendon sheath was opened widely, hand baths were given at least once a day, immobilization was used, and the results most often consisted of a sloughing tendon with subsequent amputation, or at the best a stiff finger. In view of these bad results and in the knowledge that once drainage was well established, extension beyond the limits of the sheath was unlikely, more conservative incisions were used—usually two only—one in each of the two proximal phalanges placed on the same side or on opposite sides. A cigarette drain was used, immobilization was carried out, hand baths were abandoned, and dressings were changed infrequently. The tendons appeared to slough less often. The patient's stay in hospital was still as long and a stiff finger was still unavoidable, except for the fortunate few in whose case the diagnosis was made early.

When penicillin became available, I decided to try a local instillation combined with conservative incision. In the first case treatment commenced with 20,000 units given every three hours by intramuscular injection, and incision was later carried out. In the next two cases penicillin was given intramuscularly as well as locally. In the following three penicillin was given locally only. This made a total of six patients, and the last three did just as well as the first three. This was to be expected.

Apart from limiting cellulitis, sulphonamide therapy appears to have made little difference to the end results, so that in a comparatively avascular closed space it was not to be expected that the intramuscular administration of penicillin would influence the final result.

Method.

The arm is elevated and a sphygmomanometer armband is used to obtain a bloodless field. A lateral incision is made over one phalanx, and the obscuring fat is held aside with the skin by Allis forceps. An incision is made in the sheath and the pus is expressed. A fine rubber tube is then inserted into the sheath. There is little room for it, and though this is difficult, if the tube is sufficiently fine it can be made to enter the sheath at least far enough. A cotton stitch closes the skin and is carefully tied about the tube so that the friction of the cotton prevents the tube from coming out. The stitch is not so tight as to occlude the lumen. This procedure is repeated on the other phalanx, either on the same or on the opposite side. A dressing is placed so that the tube ends penetrate through it; a "Monacrin" pad is applied to this. A dorsal plaster slab is moulded to the back of the hand and forearm and the whole is bandaged. Penicillin, 0·5 millilitre, is then injected into each tube every three hours. It may be unnecessary to do this so frequently; but the treatment has not been tried in a sufficient number of cases to allow experiment with the time interval. Before the penicillin is injected the outer pad is removed with forceps. Penicillin is injected with every aseptic precaution. The "Monacrin" pad is reapplied and the part is bandaged. This treatment is continued for five days. I am in doubt as to whether the penicillin when injected runs out round the other tube, but probably it does so. After five days the treatment is stopped, the tubes are removed and active movements are commenced.

With regard to the strength of the penicillin solution, at first 1,000 units per millilitre were used. This concentration has now been reduced to 250 units per millilitre.

Results.

Except for one case, in which tendon sloughing had commenced from a mid-line wound prior to treatment, results varied from 50% recovery of movement (one case) to 100% recovery (one case). The length of stay in hospital varied from eight to ten days so far as the wounds were concerned. The wounds were all clean and healing when the tubes were removed.

The pus was not always bacteriologically examined and I have been fortunate in being faced on each occasion with a susceptible organism. Cultural examinations should, however, be made at the time the sheath is opened and the pus is available.

Addendum.

Since this article was written a method has been described of injecting the penicillin directly into the sheath by a needle. This method may actually prove superior.

Reports of Cases.

"DDT" POISONING IN MAN.

By I. M. MACKERRAS,
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AND
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Lieutenant-Colonel, Australian Army Medical Corps.

"DDT" (dichloro-diphenyl-trichlorethane) has come into great prominence during the war, and its use has revolutionized entomological control, especially mosquito control, in the same way that penicillin has revolutionized surgery. It has consequently been made the subject of intensive war-time research, and its toxicity to animals has been very thoroughly studied. However, the extensive "literature" on this subject is almost all contained in mimeographed reports with a restricted circulation.

The action of "DDT" is twofold—it has an acute effect on the nervous system, and a more chronic action on the liver similar to that produced by many other halogenated organic compounds. The conclusion reached by both British and American workers is that "DDT" is a poison, but quite safe to use as an insecticide at the dosages and by the methods developed, provided that normal precautions are taken. The greatest danger is considered to lie in absorption of oily solutions through unprotected skin.

In spite of extensive use for a period of over two years by many people, both in the laboratory and in the field, no instance of poisoning in man was observed until Wigglesworth (1945) described the case of a laboratory worker who had repeatedly immersed his unprotected hands and arms in acetone solutions of "DDT". He suffered from aching and heaviness of the limbs, and a feeling of nervous tension; some involuntary muscular tremors were observed. Symptoms persisted for ten weeks, and recovery was not complete within a year.

In view of the importance of the subject, and of the fact that that of Wigglesworth remains the only case so far known to us to have been described, it seems desirable to record some cases of poisoning that have occurred in New Guinea.

Poisoning by Ingestion.

A native cook-boy used "DDT" in mistake for baking powder to make a tart, which was eaten by some 25 army personnel. All suffered from a feeling of giddiness and weakness, commencing one to two and a half hours after the meal. Four vomited and two were admitted to a field ambulance. All recovered within forty-eight hours. The following clinical account of the two patients admitted to the ambulance has been prepared from the notes of Captain J. M. McDonald, who was in charge of them.

Case I.

Sergeant E. reported for medical attention at 11 p.m. on August 21, 1945. He stated that at 6.30 p.m. he had had his evening meal, which included a slice of jam tart. He had felt well until about 7.30 p.m., when (whilst playing bridge) he felt giddy, became confused and found he could not concentrate. The symptoms increased, but he continued to play cards until 9 p.m. Feeling he could play no longer, he stood up; his symptoms immediately became worse, his muscles felt weak, he had "pins and needles" in his hands and arms and he staggered to the door and collapsed. He heard a rushing noise in his ears, but otherwise hearing and vision were not affected. His speech seemed thick and blurred. He felt better when lying down. At 10.30 p.m. he commenced to vomit, and vomited four times in all. At no time did he have tremors or spasms of the limbs.

On his admission to hospital, he had to be carried to the ward because he felt giddy—"as if he had been on the grog"—and his muscles felt powerless. Routine examination of all systems revealed no abnormality. His pulse rate was 100 per minute and the pulse was regular. Slight epigastric tenderness was present. The vomitus was dark in colour, but contained no blood; no diarrhœa was present. A diagnosis of acute gastritis was made. The patient was given a dose of *Mistura Bismuthi Sedativa*, which he vomited. He was then given 0·25 grain of morphine hypodermically, and slept. Next morning when he awoke he felt well, and he was discharged from hospital on August 23.

Case II.

Sergeant P. was examined at the same time as Sergeant E. He also reported having eaten a slice of jam tart along with his evening meal. He had felt well until 9 p.m., when he felt dizzy, and this feeling became worse when he stood up. He complained of palpitation and of slight numbness in the hands only. He vomited four times. He had no abdominal pain and no tremor or muscular spasm. Physical examination revealed no abnormality. His treatment and progress were as in Case I.

Poisoning by Contact.

"DDT" is commonly used in the field as a 5% solution in "distillate" (a light diesel oil), and it is generally applied by dropper bottles of a capacity of about 0·5 to 1·0 pint, with an action like the sowing of seed. Normally, these bottles have a collar on the neck to protect the hand from contamination by the fluid.

Case III.

A malaria control duty man, grown careless, used an unprotected dropper bottle for some time (probably weeks), allowing his hands (mainly the right) to become covered with "DDT" solution on six days out of seven. He developed some swelling of the right hand, numbness, and a feeling of "pins and needles" and muscular weakness, which reached the shoulder in about a fortnight; by this time he could lift only the weight of his arm. During this period he suffered from severe, deep-seated headache, which was not relieved by aspirin. He vomited at night for about three days at the end of the fortnight, and on the last day his temperature was 101° F. There was no indication of liver involvement. He then "reported sick" and was put off duty. The swelling, numbness and headache disappeared in four days, but it was fourteen days before muscular power was restored to normal.

Captain F. W. Berrill, in whose malaria control unit this incident occurred, states that he has also suffered mildly from weakness of the hand and numbness as far as the elbow, that it is a most unpleasant sensation, and that the headache has a nauseating quality.

Case IV.

Captain B., while measuring "DDT", accidentally dropped the container into the bin, and the powder flew up in a cloud, some of it getting into his eyes. He suffered intense pain in the eyes for four days, requiring repeated injections of morphine and cocaine and castor oil eye drops; he was blind for a fortnight, and had extremely severe headache for the same period. Recovery was complete.

Discussion.

There is little room for doubt that these are genuine examples of "DDT" poisoning, and that the cardinal early signs are (i) numbness and weakness of the limbs, (ii) intractable headache, (iii) vomiting and giddiness if the dose has been sufficiently large. When "DDT" is absorbed through the skin, numbness and weakness seem to be restricted to the contaminated limb, which suggests that its action may be local, or that it may travel by way of nerve sheaths. Should other cases occur, a total and differential white cell count would be indicated, for Cameron (Porton unpublished reports) has shown that a neutrophile leucocytosis is an early sign of poisoning in animals.

The toxic dose is, of course, uncertain in these cases; but, from the small amount of baking powder needed in cooking and the relatively small proportion of the body contaminated with the oil solutions, it may be suggested that of mammals man is among the more sensitive to

"DDT" poisoning. Evidence of chronic poisoning has not been seen, and there is perhaps reason to hope that signs of acute toxicity will generally develop in time for absorption to be stopped before the later effects on the liver become apparent.

It is clear from these observations that any men showing numbness, weakness and headache should be immediately relieved of any duties involving handling of "DDT" until they have completely recovered. No other treatment, except symptomatic treatment, seems likely to be required. It follows, too, that all normal precautions in labelling, distributing and handling "DDT", especially in oily solutions, should be rigidly observed; but there is no reason to believe that it is more dangerous than many other insecticides in common use.

Acknowledgements.

We are indebted to Captain J. M. McDonald and Captain F. W. Berrill for much of the information reported in this paper. Our thanks are also due to the Director-General of Medical Services, Major-General S. R. Burston, for permission to publish this paper.

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A SHORT NOTE ON THE CHANGING OUTLOOK IN OSTEOMYELITIS BROUGHT ABOUT BY THE INTRODUCTION OF PENICILLIN.

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SINCE penicillin was first used in the treatment of acute osteomyelitis at the Children's Hospital, Perth, in May, 1944, there is no record of an operation having been performed or of chronic sequelæ having resulted from the disease. If acute osteomyelitis was the only condition for which penicillin had proved of value, the above experience alone would more than justify its therapeutic *début* and the amount of money expended in its production. Those of us who have had anything at all to do with the treatment of this distressing condition have in the past been only too acutely aware of the colossal amount of suffering, disability and economic wastage which it leaves in its wake.

The following case records are open to criticism, particularly in regard to diagnosis, which has often been based on clinical findings without radiological evidence of subsequent bone changes.

If the clinical diagnosis has been wrong in those cases in which no subsequent radiological changes have been found, the fact remains that the patients (five in number) who have shown radiological changes have all been cured with intramuscular injections of penicillin alone, and that in a period of twenty-four months no operation has been performed at the Children's Hospital in a case diagnosed as acute osteomyelitis. Hence no great diagnostic errors can have been committed, since the number so diagnosed is indeed small.

Let me commence with the story of the first case in which penicillin was used after the usual operative procedure.

Clinical Record.

A boy, aged eight and a half years, fell and hurt his left leg on May 19, 1944. The leg ached next day and gradually became worse, and he had had "no sleep" for three nights prior to his admission to hospital on May 23. His temperature was then 101° F., but rose later to 104° F. Exquisite tenderness was present over the lower half of the thigh. A blood count revealed that the leucocytes numbered 12,700 per cubic millimetre and that the hæmoglobin value was 64%.

At operation on May 24 the periosteum was incised and a free flow of thin fluid resulted; two holes were drilled in the femur. On May 26 the child complained of pain in the region of the right hip joint and the upper end of the right femur, with limitation of movement of the hip joint and tenderness. No pathogenic microorganisms were grown on attempted culture from the blood.

On May 29 penicillin treatment was commenced, 20,000 units being given every two hours for four doses, and thereafter every three hours (this became the routine dosage). On May 30 the hæmoglobin value was 52% and the erythrocytes numbered 4,450,000 per cubic millimetre and the leucocytes 23,800 per cubic millimetre. On June 1 the pain in the right hip had almost gone and the temperature was falling.

On June 3 the child had a secondary hæmorrhage; the wound was packed and a blood transfusion was given. On June 7 the packing was removed in the operating theatre under nitrous oxide anæsthesia, a space being left into which half the open hand would fit comfortably. There was practically no discharge, and the lining membrane of this cavity had the appearance of greyish pyogenic membrane. For some time I did not know how to deal with it; I had a feeling that this was a "laudable" membrane, and I decided to experiment by complete closure of the cavity after taking a swab from its depths. Closure was effected by several deep sutures, all layers being included. Culture from the swab yielded a few staphylococci, but the wound healed rapidly and cleanly without adhesion to bone, so that the limb now has a perfectly normal appearance, except for the scar of incision on the skin surface. An X-ray film on June 8 showed a punctate mottling of the lower quarter of the femur and a periosteal reaction up to the mid-shaft. On June 10 a second blood transfusion of 600 millilitres was given. On June 12 the hæmoglobin value was 76%, the erythrocytes numbered 5,460,000 per cubic millimetre, and the leucocytes numbered 10,400 per cubic millimetre. On July 14 the blood sedimentation rate was 50 millimetres at the end of one hour and 78 millimetres at the end of the second hour. On August 27 palpable thickening of the lower end of the femur was present. There was no pain, tenderness or disability.

Comment.

That was the last operation performed in the hospital for acute osteomyelitis, on May 24, 1944. So impressed was I with the remarkable result that I thought it must surely be unnecessary to operate at all, and so it has proved.

Table I shows briefly the main points in regard to all cases in which the diagnosis of osteomyelitis has been made since the foregoing incident.

There was neither rhyme nor reason for the number of units of penicillin injected, since I had no information for guidance. I was aware, however, of the importance of combating anæmia by means of blood transfusion, my attention having been drawn to American literature on the subject at a military hospital. There is no doubt in my mind that it is essential in order to obtain the most satisfactory results to have the blood hæmoglobin value as nearly at 100% as possible.

The foregoing records, I repeat, are open to criticism. In some cases I did not see the patient myself before penicillin had been given and clinical signs had improved; but the one outstanding fact remains that for the past sixteen months the Children's Hospital, Perth, has not had a case of acute osteomyelitis in which cure had not been effected by penicillin without operation or sequelæ. For comparison, during the twelve months from May, 1943, to June, 1944, ten cases of acute osteomyelitis were recorded, two following compound fractures, one following open reduction of a fracture, and seven blood borne. Of these patients, one died, two were completely cured, and seven were incompletely cured when last examined.

TABLE I.

Case Number.	Patient.	Age.	Site of Lesion.	Date of Admission.	Date of Discharge.	Units of Penicillin.	History.	Clinical Findings.	Leucocytes per Cubic Millimetre.	Haemoglobin Value; Erythrocytes per Cubic Millimetre.	X-Ray Findings.	Remarks.
I	B.S.	Three years.	Right tibia, lower end.	26. 6.44	28. 7.44	1,325,000	Complained of sore foot previous day. Feverish in afternoon.	Temperature 104·4° F. Pain, tenderness, œdema, swelling, heat and redness, lower end of right tibia. Limitation of movement of ankle, with pain.	10,000 on 26.6.44 11,800 on 27.6.44	64% on 30.6.44 92% on 4.7.44	July 13 and 17, no abnormality detected, but faint periostitis evident; 4.8.44, confirmed; definite up to mid-shaft.	Last examined on 1.6.45. X-ray films (both limbs for comparison), thickening of cortex alone remains. No disability. Blood transfusion, three-quarters of a pint, on 30.6.44.
II	M.J.	Ten months.	Right radius, upper end.	1. 9.44	22. 9.44	915,000	Pain and swelling of upper portion of forearm noticed.	Temperature 102·6° F. Pain, swelling, heat, œdema, tenderness, apparently localized to head of radius.	19,200 on 4.9.44	71% on 4.9.44 61% on 8.9.44	No radiological evidence of osteomyelitis on 1.9.44, 5.10.44 or 1.6.45.	Transfusion of half a pint of blood given on 8.9.44. Temperature normal on tenth day (10.9.44).
III	C.O.	Twelve years.	Left fibula, lower end.	8. 9.44	29. 9.44	1,250,000	For two days swelling and pain in left ankle.	Temperature 101° F. Pain, swelling, redness, œdema and acute tenderness of inferior extremity of left fibula. Extremely ill, weakly native girl.	—	—	27.9.44, mottling of lower end of fibula. Periosteal reaction.	Large collection of fluid appeared over lower end of fibula, obvious pus. Advised "leave alone", but "restless resident" incised it on 11.9.44, obtaining only some thin, harmless-looking sanguineous pus. It was subsiding; 18.9.44, quite healed.
IV	J.A.	Four years eight months.	Right femur, upper end.	30.10.44	8.12.44	810,000	25.10.44, vomited. 26.10.44, dragged right leg. 27.10.44, feverish, pain in right thigh.	Temperature 104·6° F. Right hip flexed, tender upper aspect femur. 31.10.44, œdema in addition and referred pain to knee. 2.11.44, bilateral swelling of parotid glands. Temperature 104° F. Penicillin treatment commenced, 10,000 units every two hours for 24 hours, then every three hours by day, every four hours by night.	11,800 on 30.10.44 19,800 on 7.11.44 17,400 on 11.11.44 7,500 on 19.1.45	66%; 4,200,000 90%; 5,200,000 92%; 5,000,000	16.11.44, no abnormality. 6.12.44, disturbance of bone pattern in neck of femur. 5.1.45, Brodie's abscess in upper aspect of neck of femur. 1.6.45, still shows mottling in neck; Brodie's abscess disappeared.	It is interesting to note that the Brodie's abscess appeared and disappeared after the course of penicillin treatment had terminated.
V	C.E.	Ten years.	Right femur, lower end.	6.11.44	12. 2.45	1,040,000	Five days earlier twisted right knee at school sports. Unable to walk on it, painful on movement since.	Temperature 102° F. Knee swollen, hot, tender, held in 150°; tender medial side lower end of femur. 10.11.44, aspiration of knee joint. Attempted culture unsuccessful. Whole thigh swollen. Tenderness spreading.	8,800 on 7.11.44 25,000 on 9.11.44 18,800 on 14.11.44 8,100 on 9.2.45	76% on 5.1.45	6.11.44, no abnormality. 14.11.44, osteomyelitis lower fifth of femur. 22.2.45, rarefied areas. Recalcification.	Treated by sulphadiazine and weight extension. Penicillin treatment commenced on 10.11.44.
VI	N.P.	Twelve years.	Left cuboid.	19.11.44	1.12.44	530,000	On 17.11.44, fell down steps. Pain increasing. Kept him awake previous night.	Possibly cellulitis, but tenderness and pain suggestive of osteomyelitis. 19.11.44, woke crying with pain at 10.30 p.m.; 20.11.44, examined by me. Diagnosis of osteomyelitis of cuboid. Penicillin treatment started.	11,100 on 20.11.44 12,500 on 22.11.44	64% 84%	18.11.44, no abnormality. 1.6.45, some disturbance in ossification in antero-lateral angle of cuboid compared with right side. Almost completely disappeared by August.	Doubtful diagnosis, though supported by X-ray findings. On 27.11.44, no pain on movement. Slight tenderness over bases of outer four metatarsals.

TABLE I.—*Continued*

TABLE I.—*Continued.*

Case Number.	Patient.	Age.	Site of Lesion.	Date of Admission.	Date of Discharge.	Units of Penicillin.	History.	Clinical Findings.	Leucocytes per Cubic Millimetre.	Hæmoglobin Value; Erythrocytes per Cubic Millimetre.	X-Ray Findings.	Remarks.
VII	C.D.L.	Two years eleven months.	Right femur, lower end.	2. 1.45	16. 2.45	500,000	About two weeks earlier began to limp. Improved, but condition recurred on 31.12.44.	Right knee swollen and hot; very tender, lower end of femur. 3.1.45, still hot, less tender.	—	—	2.1.45, some thickening of periarticular tissues of knee and irregularity of medial side of femoral epiphysis, not necessarily abnormal. 8.2.45, possible trace of ossification in raised periosteum posteriorly compared with left femur. 1.6.45, no change.	Diagnosis doubtful. Last examined on 1.6.45, no disability. Temperature 99·4° F. on admission to hospital, 100·2° F. for three days, 99·6° F. for three days, then up to 102°, 99·4° F.
VIII	G.M.	Two years.	Left fibula, lower end.	16. 1.45	14. 2.45	700,000	About one week earlier, soreness of left ankle; noticed swollen and red.	Temperature 100·4° F., swelling and œdema, redness, heat and tenderness left lateral malleolus.	13,200 on 16.1.45 10,200 on 5.2.45	—	19.1.45, slight rarefaction three-quarters of an inch above epiphyseal line. 1.9.45, no abnormality detected.	Penicillin treatment commenced on admission to hospital. Immobilization in plaster of Paris.
IX	G.F.	Six years.	Left femur, lower end.	30. 1.45	16. 3.45	600,000	Sore left knee four days. Fell over when playing. Referred by own doctor for incision.	Temperature 100° F. Brawny swelling, inner side knee. Mantoux test 1/10,000 positive result. Blood sedimentation rate, 1.2.45, 122 millimetres in one hour. 26.2.45, four millimetres in one hour. No organisms found in a smear, but two colonies grown in culture (possibly due to contamination).	12,100 on 1.2.45	Erythrocytes, 4,580,000	1.2.45, no abnormality except swelling of soft tissues in both antero-posterior and lateral views round lower third of femur. 1.6.45, no abnormality except some central rarefaction in antero-posterior view in lower quarter of femoral shaft.	Diagnosis of osteomyelitis doubtful.
X	M.W.	Twelve years.	Right hip, arthritis.	6. 3.45	29. 3.45	1,000,000	Pain right leg week earlier; limping; worse day before admission.	Temperature 102° F. Right leg extremely tender. Cannot bear any movement.	22,100 on 6.3.45 16,100 on 21.3.45	Hæmoglobin, 15 grammes *per centum* on 12.3.45	6.3.45, no abnormality detected.	Has not been seen since.

Acknowledgement.

I wish to express my thanks to Dr. A. R. Edmonds, medical superintendent of the Children's Hospital, Perth, for help in the preparation of the statistical details in the table.

Addendum.

The following case of extreme interest was overlooked in the compilation of the foregoing notes.

Clinical Record.

A boy, aged twelve years, was admitted to the Children's Hospital on June 11, 1945. He had had a stye ten days previously. A few days later his upper lip became sore and swollen; two days before his admission to hospital he squeezed it.

On his admission to hospital, gross cellulitis of the upper lip was present. His temperature was 103·8° F. Penicillin therapy was begun immediately. Next day the boy had a typical scarlatiniform rash; he was transferred to the Infectious Diseases Hospital as suffering from scarlet fever. His temperature dropped, so for three days no further penicillin was administered; but then his temperature rose again, so penicillin was once more administered from June 15, until June 20, when the boy was again admitted to the Children's Hospital. His temperature swayed up to 101° F. every day, and the upper end of the right tibia was painful, tender and swollen.

On the boy's readmission to the Children's Hospital, his condition was diagnosed as acute osteomyelitis of the head of the right tibia. Attempted culture of micro-organisms from the blood was unsuccessful. A blood examination revealed that the hæmoglobin value was 13·5 grammes *per centum*, and that the leucocytes numbered 10,900 per cubic millimetre. Penicillin treatment was again given, and his temperature gradually subsided. He was discharged from hospital, apparently cured, on July 3, 1945. The total amount of penicillin given was 540,000 units at the Infectious Diseases Hospital and 1,100,000 units at the Children's Hospital.

On July 20 the child was again examined in the orthopædic clinic; the upper end of the tibia was painful, hot and swollen, although his temperature was normal. The leucocytes numbered 20,000 per cubic millimetre. An X-ray film taken on that day revealed mottling of the upper end of the tibia with periosteal reaction suggesting active infection. The child was readmitted to hospital on July 22, still with a normal temperature, and operation was performed on July 23. The upper half of the tibia was thoroughly gutted out, and about one ounce of thick pus was obtained; this yielded a growth of hæmolytic *Staphylococcus aureus* on culture. The same evening a transfusion of 500 millilitres of blood was given. A course of 1,000,000 units of penicillin was commenced on the day of the child's readmission to hospital, and penicillin was also injected locally twice a day for five or six days through a tube inserted at the time of opera-

tion. The wound was sutured at operation; it healed by first intention, and the child was discharged from hospital on August 14, apparently cured. After operation his temperature was elevated to 101° F. for three days.

Comment.

The interesting feature about this case, which is the only one in which penicillin was given and operation was performed also, is that the osteomyelitis followed the administration of approximately 50,000 units of penicillin given on the day of the child's admission to hospital, June 11. Presumably this dose was not sufficient to cure the septicæmic state.

POST-ABORTIONAL TETANUS WITH RECOVERY.

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IN 1941 Weinstein and Beacham reviewed 170 reported cases of post-abortional tetanus, and came to the conclusion that although the incidence of the disease was low, the mortality rate was high, averaging 84%. Most cases followed criminal abortion, and the incubation period was six to twelve days. Weinstein and Beacham commented on the paucity of case reports in the English and American journals. For this reason it was thought that a description of this case might be of some value.

Clinical Record.

Mrs. A.C., aged twenty-seven years, was admitted to the Queen Victoria Hospital on December 3, 1943. She had two children, the younger being six months old. Five days before her admission to hospital, having had amenorrhœa for two months, she syringed herself with a solution of antiseptic soap and procured the abortion of a fœtus, the abortion being attended by considerable hæmorrhage. On the morning of the fifth day after the interference she awoke with a stiff neck and jaw, and noticed that she could not yawn properly. By breakfast time she was unable to open her mouth to eat. The stiffness gradually became painful and more severe during the course of the day, and she was admitted to hospital at 10 p.m.

Inspection revealed a pale, anxious-looking woman with a pronounced *risus sardonicus*. She was unable to turn her head or open her mouth. Her eyebrows were raised and her eyelids half-closed and twitching. The sternomastoid muscles were standing out like cords, and extreme stiffness and pain were present in the neck, made worse by movement. The abdomen was not rigid. Examination of heart and lungs revealed no abnormality. The blood pressure was 180 millimetres of mercury, systolic, and 90 millimetres, diastolic. The uterus was enlarged to the size of an eight weeks pregnancy. No pelvic tenderness was present, and the lochia were not offensive. The temperature was 99·4° F., the pulse rate was 104 per minute, and the respirations numbered 22 per minute. The hæmoglobin value the following day was 53% (Neoplan).

Treatment was instituted five days after the introduction of infection, and fourteen hours after the onset of symptoms. An intradermal skin test with tetanus antiserum was performed with negative result. Intracervical smears and material for cultural examination were taken. Sedation was commenced with paraldehyde, six drachms being given rectally; 100,000 international units of tetanus antiserum were administered intravenously in 300 millilitres of normal saline solution at the rate of thirty drops a minute, the infusion taking seventy-five minutes. There was no reaction. During this period the intracervical smears were stained, and organisms with terminal spores resembling *Clostridium tetani* were seen; large Gram-positive bacilli resembling *Clostridium welchii* were also present. The bacteriological diagnosis of tetanus was later confirmed by cultural methods. When the administration of serum was completed, curettage was performed under light ether anæsthesia, and a large amount of clean-looking placental tissue was removed. Thereafter treatment resolved itself into prevention of spasms by adequate sedation, specific treatment with antitoxin, the prevention of bronchopneumonia, and the maintenance of adequate nutrition. The details of treatment will be discussed later.

The temperature ranged between 99° and 102° F. for the first ten days, and over the next two weeks rose in the evenings to 99° or 100° F. The pulse rate averaged 120 per minute over the first two weeks, declining gradually to 90 in the fourth week of the illness. Skin actions were frequent and profuse. Incontinence of urine was present for over a week. The bowels were not open spontaneously, and distension appeared on the second day, but this was relieved by a bowel washout.

Severe spasms of the facial and shoulder muscles occurred four hours after the patient's admission to hospital, and true opisthotonic spasms were observed during the following night. On the third day pronounced abdominal rigidity was also present, and any interference produced spasms. During the following night too little sedative was given, and severe spasms occurred, with extreme opisthotonus and generalized rigidity, in which the patient screamed with pain. Thereafter sedation was increased; "Sodium Amytal" was used almost exclusively, and it appeared effective in preventing severe spasms, though minor spasms occurred on any stimulus. The most severe spasms occurred on the fifth day of the patient's illness, and were accompanied by cyanosis. The dosage of "Sodium Amytal" required at this stage was 0·6 gramme every four hours. After the fifth day the spasms gradually became less severe, though generalized rigidity persisted, and up to the eleventh day the patient was liable to sudden facial spasms, in which she bit her tongue severely. The intense pain caused by this seemed to initiate a generalized spasm, in which she became cyanosed, with stertorous respirations and a pulse rate of 160 to 180 per minute. By the eleventh day rigidity was passing off, in the reverse order in which it had affected the muscles. On the fifteenth day she was able to turn her head slightly, though she was still subject to severe facial spasms. On the seventeenth day she still had considerable trismus and stiffness of the neck and shoulder muscles. Some abdominal rigidity was still present, but she was able to move her arms and legs. By the twenty-second day she was able to open her mouth about three-quarters of an inch and was generally more relaxed. She said that whenever anyone spoke to her or touched her she could feel her whole body stiffening. By the twenty-fourth day she was able to hold a cup and drink from it, and her neck stiffness had disappeared. She still had the twitching of the eyelids which was noticed on her admission to hospital. Thirty-four days after the onset she had completely recovered, and a few days later she was allowed to sit out of bed. She was discharged from hospital on January 19, 1944, forty-seven days after her admission.

Details of Treatment.

General Management.

The patient was nursed in a single room, which was kept darkened. Special nurses were in constant attendance upon her, and their care and skill contributed greatly to her recovery.

Prevention of Spasms.

For the prevention of spasms by sedation, a drug was sought which would have a maximal antispasmodic effect with a minimal narcotic effect, which would not unduly depress the respirations, and which had a wide margin of safety. "Sodium Amytal" seemed to meet these requirements more adequately than any other drugs used at the present time. It may be given intramuscularly or rectally. In the case under discussion the intramuscular route was used exclusively. It was found that the drug acted in five to ten minutes, and injections were necessary every four hours. A small dose was used at first (0·25 gramme), but this was rapidly increased up to 0·6 gramme, which appeared to produce the required depth of sedation. "Sodium Amytal" appeared to have an excellent effect in

allaying the fear and spasm, and in producing a light sleep from which the patient could easily be roused for feeding or other nursing treatment. The greatest amounts were given on the fifth and sixth days, 3·6 grammes being given over the twenty-four hours. Spasms recurred if the effects of the drug were allowed to wear off, but a further injection produced relaxation within a few minutes. It was not found necessary to use the drug intravenously, though the means for doing so were kept constantly in readiness.

Other drugs were employed because sufficient quantities of "Sodium Amytal" were not available at this time. "Avertin" was not used because of its small margin of safety, and because its narcotic effect was considered too great in proportion to its antispasmodic effect. Paraldehyde in doses of two to four drachms was employed with good effect, but its narcotic effect was greater in proportion to its antispasmodic effect than was the case with "Sodium Amytal". The oral route was tried first, but was abandoned in favour of the rectal route, since administration of the drug by mouth caused coughing and initiated a severe spasm. Morphine and hyoscine were used in conjunction and were found to be particularly useful during the period of serum reaction when severe pains were distressing the patient. The dosage used was one-sixth of a grain of morphine and one one-hundredth of a grain of hyoscine. "Sodium Luminal" given intramuscularly was tried, but was found to be disappointing, being much slower in action than "Sodium Amytal" and less effective in allying spasm.

Antitoxin.

The initial dose of antitoxin was 100,000 international units intravenously. Thereafter 20,000 units were given intramuscularly each day up to a total dosage of 200,000 units. A serum reaction was observed, consisting of severe headache and muscle pains and a mild urticarial rash from the eighth to the twelfth day.

Prevention of Bronchopneumonia.

A study of the reported cases leads one to the conclusion that bronchopneumonia is the immediate cause of death in fully half the cases, owing to deep sedation and inability to cough and expectorate mucus. Consequently strenuous efforts were made to prevent it, the following methods being employed.

1. The patient was nursed flat in bed with the foot of the bed raised. Her position was changed frequently, so that she lay on her back, on either side or on her face. At intervals she was placed so that her head and shoulders hung down over the head of the bed; in this position mucus poured from her nose and mouth. This was usually done just before a sedative was administered, so that the patient could make some attempt to cough and expectorate.

2. Drainage was employed at the same time in the form of a rubber catheter to a suction apparatus through which mucus could be removed from the mouth and pharynx. The use of atropine was avoided, owing to its action in increasing the viscosity of secretions.

3. "Carbogen" was administered regularly to counteract the respiratory depression produced by sedation.

4. Inhalations of *Tinctura Benzoini Composita* with menthol were given in a further attempt to liquefy the secretions.

5. Throat swabbings were taken from all attendants, with the object of excluding those harbouring hæmolytic streptococci.

6. Oral sepsis was prevented by frequent and careful mouth irrigation.

7. Care was taken with feedings. Gaps between the teeth permitted the introduction of food, and swallowing, though difficult for the patient, was never impossible; choking occurred only if attempts were made to administer fluids which tasted unpleasant.

8. Chemotherapy was instituted on the sixth day, when signs were observed of diminished air entry at the base of the right lung and scattered rhonchi in the chest. Sulphathiazole was employed, the initial dose of two grammes being followed by one gramme every four hours up to a total dosage of 21 grammes over the next six days. Frank signs of bronchopneumonia did not develop at any stage.

Maintenance of Nutrition and Hydration.

Feedings were given every four hours; they consisted mainly of milk drinks containing "Aktavite" or "Benger's Food", egg flips, junket, orange juice with glucose, and broth with "Marmite" added. The daily fluid intake averaged two to four pints. During the first few days swallowing was difficult and water was given for forty-eight hours by the continuous rectal drip method. On the second day attempts were made to pass a Rehfuss tube, but without success, and as the attempts initiated spasms they were abandoned. Ferrous sulphate (thirty grains), thiamin hydrochloride (two milligrammes) and "Adexolin" (thirty minims) were given orally from the sixth day.

Discussion.

There is considerable divergence of opinion in the literature as to both the optimum dosage of antitoxin and the routes to be adopted. Vener and Bower, who report a mortality rate of 29% in 100 cases of surgical tetanus, advocate the administration of 200,000 units by various routes over the first thirty-six hours. They prefer the intrathecal route, using cisternal puncture; but this is still condemned by most writers on the subject. Spaeth analysed 276 cases of tetanus, and his conclusions were that a total dosage of 60,000 American units (120,000 international units) was sufficient, and that the intrathecal route was better avoided. Serum is of doubtful value in a fully developed case, but it is of value in early cases, and should always be given before local treatment is undertaken.

Local Treatment.

Writers on surgical tetanus are mostly in favour of a fairly rigorous treatment of the wound once adequate doses of tetanus antiserum have been given. Spaeth states that the treatment of the wound should follow the same surgical principles as that employed in the absence of tetanus. In spite of this, Weinstein and Beacham, in a review of 170 collected cases of post-abortional tetanus, state that "in post-abortal tetanus dilatation and curettage are generally and correctly condemned". They give no reasons for this statement. While curettage cannot be expected to remove the organisms which have already invaded the uterus, it will reduce the danger of hæmorrhage and secondary infection, and given adequate amounts of circulating antitoxin there should be no danger from such a procedure.

Conclusions.

1. A severe case of post-abortional tetanus is described, in which the incubation period was five days, the period of onset sixteen hours, and the duration of clinical symptoms and signs of tetanus thirty days.

2. The advantage of curettage after adequate treatment with antitoxin is discussed.

3. "Sodium Amytal" appears to be an effective agent for the control of spasms.

4. Postural treatment is an important factor in the prevention of bronchopneumonia.

Acknowledgements.

We are indebted to Dr. Winifred Kennan for permission to publish this case. We also wish to express our thanks to the Fourth American General Hospital for supplies of "Sodium Amytal" when the existing stocks became depleted.

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A CASE OF GUNSHOT WOUND OF THE LARGE AND SMALL INTESTINES.

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THE following case is thought to present some features of interest.

Clinical Record.

Private J.P., aged twenty-four years, was wounded by a sniper's bullet soon after the landing at Labuan Island on June 10, 1945. He was brought back to the beach and carried by landing craft to an Australian landing ship. Aboard this ship he was operated on by an army surgical team, and during the next four days he was taken to an Australian general hospital at Morotai. Here he was treated until September 26, when he was evacuated to Australia by hospital ship. At the time when he was wounded three of Private P.'s friends were killed in attempts to rescue him under fire.

On his arrival aboard the landing ship, four hours after he had been wounded, the patient was suffering from shock and was found to have two large jagged wounds in the lower part of the abdomen, both bleeding freely. The wound of entry was just lateral to the left anterior superior iliac spine, shattered fragments of which were visible. The exit wound was through the left rectus muscle, and through it were prolapsed two loops of small bowel.

A continuous transfusion of stored blood was started and operation was begun four and a half hours after receipt of the wound. Before operation the patient was given injections of gas-gangrene antitoxin (10,000 units), tetanus antitoxin (1,500 units) and penicillin (50,000 units). A few ounces of clear urine were obtained by catheterization, and digital examination of the rectum failed to detect any blood. An aspiration tube was passed into the stomach, and through this the stomach was kept empty by intermittent suction.

Under ether anæsthesia induced by the "open" method, rapid exposure was gained by joining entry and exit wounds, which were at about the same horizontal level. Brisk hæmorrhage from the iliac fossa was temporarily controlled by packing, and the peritoneal cavity was explored and found to contain blood and fæces. The small bowel was examined throughout its length and found to have four perforations. One of these was only half an inch across, but the other three were almost complete circumferential tears; in each case a small bridge remained intact at the mesenteric border. The peritoneum on the anterior wall of the sigmoid colon had been split, but the underlying muscular coat was intact. The transverse colon was found to be completely severed, a tear running back three inches into the mesocolon. No other visceral damage was detected.

The tears in the small bowel were repaired with double layers of continuous sutures. Hæmostasis was secured in the torn mesocolon, and the edges of the tear were approximated by sutures. A broad spur four inches long was then formed between the two open ends of the transverse colon by a double row of sutures, and this part of the bowel was brought out through the medial part of the incision as a "double-barrelled" colostomy. Time was not wasted in making a separate incision for this purpose, as by now the patient's condition was causing concern. The peritoneum was closed around the colostomy without drainage, and then the iliac fossa was explored. The innominate bone had been shattered in its anterior part, and some damaged iliacus muscle had to be excised. There was considerable hæmorrhage from deep in the iliac fossa, possibly from the bone in the region of its nutrient artery. The patient's condition did not allow either identification of the bleeding point or exposure and ligation of the internal iliac artery, so a pack was placed in the iliac fossa extraperitoneally and brought out through the lateral end of the wound. The remainder of the wound was then closed in layers around the colostomy, some difficulty being experienced in closing the damaged muscle layer.

For the next six days a state of paralytic ileus persisted, and the bowel was kept empty through an indwelling duodenal tube, at first by intermittent aspiration and later by an improvised Wangensteen continuous suction apparatus. Glucose (5%) in Ringer's solution was given by the continuous intravenous drip method and supplemented by intramuscular infusions of normal saline solution in an attempt to keep a positive fluid balance of three litres per day. Quinine was given intravenously, 10 grains per day, in place of the normal suppressive oral dose of "Atebrin". Sulphadiazine was given intravenously over the first four days to a total of 33 grammes. The urine was kept alkaline by administration through the intravenous drip apparatus of the sodium citrate solution supplied for use in the collection of blood for transfusion. For the first three weeks penicillin was given by intermittent intramuscular injections of 15,000 units every three hours. Fresh and stored blood was given to a total of four and a half litres.

On the seventh day flatus was passed through the colostomy, and on the eighth day the colostomy commenced acting well. The hæmoglobin value was then 9·6 grammes per 100 millilitres, and a further two litres of stored blood were given. The following day an attempt was made to add pooled human serum to the fluid given by intravenous drip, but this immediately produced a rigor. A further 1,400 millilitres of fresh blood were given the next day, but a second attempt to give wet serum had to be abandoned because of immediate venous spasm.

On the twelfth day the patient was commencing to take food by mouth, and the duodenal tube was removed and all intravenous therapy ceased. At this stage the lateral half of the wound was infected and had broken down widely, exposing the abdominal muscles and the innominate bone, which were constantly covered in fæces. This process had started at the site of the pack in the iliac fossa; there had been some discharge from the wound there ever since the pack was removed on the third day. Considerable tenderness was present over the anterior third of the bone, and the temperature rose in the evenings to 102° F.; The leucocytes numbered 18,000 per cubic millimetre of blood. On the sixteenth day, under "Pentothal" anæsthesia, a large loose fragment of the bone was removed, and an enterotome was applied to the colostomy spur to a depth of three and a half inches. The spur had been successfully crushed through four days later, with consequent deviation of some of the fæcal flow to the anus. After this procedure and the oral administration of sulphaguanidine the wound infection gradually diminished.

On the seventeenth and eighteenth days copious melena occurred, necessitating a further transfusion of two litres of stored blood. This was attributed to a secondary hæmorrhage from the suture lines in the small bowel.

Post-Operative Course and Complications.

For the next week or two all went well, and the patient rapidly gained in weight. This happy state of affairs lasted until the thirtieth day, when he complained of colicky abdominal pain and commenced vomiting. His colostomy ceased to act, and he presented the clinical picture of acute small bowel obstruction. It was considered that this was probably produced by diffuse fibrinous adhesions, and it was decided to adopt conservative

measures in order to give these a chance either to resolve or to progress to the formation of localized bands more amenable to effective operative treatment. Accordingly, a duodenal tube was again passed and connected to a Wangensteen continuous suction apparatus, and all nourishment by mouth was discontinued. Fluids were adminstered parenterally in an attempt to keep the positive fluid balance as near as possible to three litres a day. Later this became rather difficult, owing to shortage of veins, and the intravenous administration of glucose and saline solution was supplemented by the intramuscular and rectal administration of saline solution.

From time to time the aspiration apparatus was clamped off, but the persistence of the obstruction was demonstrated by the rapid recurrence of pain, distension and vomiting of fæculent material. In the hope that it might produce better local relief of the affected bowel, a Miller-Abbott double-lumen tube was passed on the evening of the forty-second day. This passed well down the small bowel, and had the six foot mark by the forty-fourth day. At this stage, however, pain, distension and vomiting recurred, although suction was continued and the lumen of the tube was demonstrated to be patent. It was thought that these symptoms might be due to pylorospasm, and atropine was given in large doses without relief. The tube was then slowly withdrawn, aspiration being continued. When the tube had been withdrawn to the three foot six inches mark, a sudden and profuse drainage of fæculent material occurred, with immediate relief of symptoms. The tube was then withdrawn to the duodenum and thereafter used as a duodenal tube. It is assumed that part of the matted bowel must have become obstructed around the tube after the tip had successfully passed the obstruction in this loop.[1]

On the forty-seventh day aspiration was again stopped and obstruction found to be still present. Small bowel obstruction had now been present for seventeen days. The patient was in fair general condition, but had lost a great deal of weight, and only one more subcutaneous vein could be found for transfusions. His pulse rate was 84 per minute and temperature 98·4° F. His tongue was moist, although records showed that his fluid balance had been poor for several days. The hæmoglobin value of his blood was 12·8 grammes per 100 millilitres, and the leucocytes numbered 8,600 per cubic millimetre. His abdomen was not distended; some tenderness was present below the colostomy; no peristalsis was audible. Digital examination of the colostomy revealed no local obstruction of the large bowel; rectal examination revealed no abnormality. It was decided that conservative measures were no longer safe, and that operation was indicated. This was performed on the following day.

Under cyclopropane anæsthesia the abdomen was explored through a right paraumbilical incision. The coils of the upper two or three feet of jejunum were found distended and diffusely adherent to one another and to the adjacent viscera. Most of the affected bowel lay in the left side of the abdomen, and one loop was fairly firmly adherent to the splenic flexure of the colon. All adhesions were separated by blunt dissection, some with difficulty. There were no discrete bands, and no evidence of constriction at the original sites of suture in the small bowel. The abdomen was then closed.

Aspiration was continued for another two days and the tube was then withdrawn because of troublesome stomatitis. The colostomy acted well on the fifty-first day—that is, twenty-one days after the onset of small bowel obstruction and four days after laparotomy. Thereafter the patient ate well and rapidly gained in weight. A hæmatoma developed under the lower end of the laparotomy scar six days after operation, and this was responsible for a belated course of vitamin *K* injections.

From now on fæces were occasionally passed rectally, but the colostomy showed no signs of closing and the greater part of fæces and flatus continued to pass through it. The lateral part of the original wound was clean but still unhealed, and bare bone was still visible in it.

[1] These observations were confirmed by X-ray examination.

On September 13, ninety-six days after the patient had received the wound, under nitrous oxide and ether anæsthesia, the colostomy was dissected out of the scar tissue extraperitoneally and closed. The abdominal muscles were with difficulty closed over the colostomy, and the skin was sutured over these and over the hitherto exposed innominate bone.

The patient's bowels commenced to open normally two days later. The wound healed well, except for a little discharge at the lateral end for a few days.

On September 26, the patient was evacuated to Australia by hospital ship. When heard from three months later he was symptomless, his wound was well healed, and he was able to go about perfectly normally.

Discussion.

It is a welcome break from the routine conditions of war surgery for the surgeon who does the initial operation in such a case to have the patient under his care until recovery is practically complete.

The fairly large wounds of the bowel from a single small projectile were no doubt due to the fact that the bullet fractured the innominate bone on its way into the abdomen, thus producing a disruptive effect on the soft tissues similar to that seen in gunshot wounds of the limb bones.

In the tropics, where fluid and salt are lost in the sweat in large quantities, it is difficult to maintain an adequate parenteral fluid intake for more than a fortnight, particularly when allowance is made for venous thrombosis from quinine injections. At the time of the second operation only one vein remained for transfusion, and these considerations helped in the decision to abandon conservative treatment at that stage.

It was always impossible to give this patient intravenously either wet pooled human serum or reconstituted dry plasma. Every attempt to do so produced immediate rigors or local venous spasm and thrombosis. Whole blood, however, whether fresh or stored, was always well tolerated. As a result of this difficulty, it is surprising that his serum protein content, which was 6·7 grammes per 100 millilitres on July 8, had fallen only to 6·5 grammes per 100 millilitres on July 30. The only protein he had received in this period was that contained in one litre of stored blood. He lost considerable weight in this time, and no doubt his serum protein level was maintained at the expense of his tissue proteins. It is regretted that amino-acid preparations for intravenous use were not available.

In intestinal obstruction from diffuse adhesions a Miller-Abbott tube has little advantage over a simple duodenal tube, and this case demonstrated a real disadvantage—that is, that the tip of the tube can pass through part of the obstructed bowel, which then closes once more behind it. This strengthens the belief that the best form of intestinal drainage in most cases is a four-foot length of plain rubber tubing, of an external diameter of three-sixteenths of an inch, with a few lateral holes punched near the end, and unweighted. Such a tube can be easily passed to the stomach or duodenum by the nostril. The absence of a weight allows the end to be left open, and the resulting straight channel through the tip avoids many blockages.

Summary.

A case has been described of gunshot wound of the abdomen traversing the innominate bone, severing the transverse colon and producing multiple lacerations of the small bowel. The patient survived several complications, including delayed intestinal obstruction, and progressed to apparently complete recovery. Some aspects of the case have been briefly discussed.

Acknowledgements.

Successful treatment in such a case is impossible without skilful and devoted nursing such as this patient received. Thanks are due to Lieutenant-Colonel Alan Lendon for his advice in the later stages of the case, and to the Director-General of Medical Services, Australian Military Forces, for permission to publish this case report.

Reviews.

A TEXTBOOK OF MEDICINE.

IN his introduction to the seventh edition[1] of his "Textbook of Medicine", Dr. J. J. Conybeare refers to the great demand for books, including medical books, as one of the surprising features of the war. Commenting on the fact that this edition is the fourth to be published since 1939, the author states that the number of copies sold since the war began more than equals the total number printed in the previous ten years. While this is, of course, a tribute to an excellent textbook, it is at the same time a very gratifying indication of the determination of large numbers of medical men serving in the forces to keep themselves abreast of medical knowledge in spite of their temporary separation from centres of medical learning.

The present volume is in the main a reprint of the sixth edition, though a limited portion has been rewritten, notably the article on pulmonary tuberculosis and a few of the sections grouped under respiratory, cardio-vascular and renal disorders. There are new articles on sarcoidosis and *periarteritis nodosa* which, when we consider the limits of space available, are quite satisfactory. It is, we think, a pity that in a textbook published in 1945 only the briefest general reference is made to penicillin, though the author expressly states that it was thought best, in view of the rapid progress in its use, to omit any detailed description of this form of chemotherapy. Unfortunately that decision compels the reader to seek elsewhere than in his textbook for information not only about how to administer an officially recognized remedy, but also as to when its administration is indicated. Certainly by the time the edition went to press sufficient evidence was available to justify at least a cautious modification of the statement appearing under the treatment of bacterial endocarditis: "No form of treatment appears to have any beneficial effect."

Another item of recent knowledge that we think might well have been included in a textbook being brought up to date is a reference in the section dealing with "Infectious Diseases" to the various congenital defects in infants that have been attributed to their mothers' having contracted rubella in the early months of pregnancy.

We regret that the practitioner who elects to give his malarial patient quinine by the intramuscular route is still advised to administer eight to ten grains of quinine dissolved in two to four millilitres of water, as so concentrated a solution must almost inevitably lead to necrosis of the muscle.

PAIN IN CHILDBIRTH.

THE second edition of Lull and Hingson's "Control of Pain in Childbirth" presents a survey of all methods of producing amnesia, analgesia and anæsthesia in obstetrics.[2] The book is divided into three parts, the first devoted to anatomy, physiology, pharmacology and psychology, the second to the technique of administration of various drugs, and the third to maternal and fœtal complications requiring special care. The mode of action of the different analgesic drugs and anæsthetics is discussed in detail, together with their effect on both mother and fœtus. There is an excellent section on the psychological management of the pregnant patient.

The authors have been pioneers in developing the technique of continuous caudal anæsthesia for labour, and it is therefore natural that a large part of the book should be devoted to detailed descriptions of this method. The case for the use of caudal anæsthesia is, however, presented fairly, no exaggerated claims being made for it; many contraindications are set out and stress is laid on the fact that it should be attempted only in a well-staffed hospital by a physician experienced in its use. Even under these conditions about 40% of women present contraindications to the use of the method. The great advantage of caudal anæsthesia is that the baby escapes narcosis with its accompanying respiratory depression, and that in the third stage of labour the uterus contracts perfectly with minimal blood loss.

All drugs used for analgesia or amnesia in labour are considered, the method of administration and dosage being described. The various anæsthetic agents are also fully discussed. A good deal of space is devoted to the technique of spinal analgesia and anæsthesia, as well as to the various methods of regional nerve block, such as parasacral and pudendal nerve block. Local anæsthesia for both vaginal delivery and Cæsarean section is also described in detail.

The advantages and disadvantages of the different methods of pain relief are fully set out; indications and contraindications for each are considered.

This book is well printed and profusely illustrated, but there are a few obvious typographical errors; in parts it is verbose and there is some repetition. It is, however, an excellent book completely covering modern knowledge and practice in this subject. It should be very valuable to both the obstetrician and the obstetric anæsthetist.

CHIROPODY.

AT the present time, when standardization of training in chiropody is under discussion, the publication of "The Essentials of Chiropody", by Charles A. Pratt, is timely.[1] In this book the author has provided a clear, concise account of chiropody from the student's point of view.

The subject matter is built on a sound anatomical basis, and in this regard excellent use has been made of diagrams from a well-known pocket atlas. Care has been taken to indicate the limitations of the chiropodist and stress has been laid on the conditions under which medical advice should be obtained. Good counsel is given about the handling of patients and practical details are supplied on how to set up practice. The only criticism that can be offered concerns what is generally considered a very minor complaint—the soft corn. The author has omitted to mention the very frequent association of a projecting tubercle at the base of a phalanx. When this is present no amount of conservative treatment, short of constant wearing of an interdigital pad, will afford relief.

The book can be strongly recommended to students of chiropody as one which will provide an essentially practical approach to their problems. If more textbooks were written along these lines the way of the student would be made easier. The book will undoubtedly find its place as a standard textbook, but the relatively high price may prevent it enjoying the popularity that it deserves.

THE HAIR AND THE SCALP.

THE third edition of "The Hair and Scalp", by Agnes Savill, has been very considerably revised, especially in regard to modern therapy.[2] The section dealing with the more rare conditions has been enlarged to include a number of conditions more common in North America. As the subject matter is restricted, it is natural that there is a good deal of detail which many practitioners will but rarely require. However, the arrangement of the book, by which presenting symptoms are used as chapter headings, makes it a handy work for reference. Modern hair-waving procedures have been closely investigated, and the author gives an insight into these methods which, it is felt, practitioners may often need to investigate. Some methods of treatment that are described, such as vaccine therapy for seborrhœa of the scalp, may not meet with agreement from all practitioners, but treatment is clearly set out and alternative measures are suggested. This is a book which will interest dermatologists and provide a most useful reference for practitioners generally.

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[1] "Textbook of Medicine", by Various Authors, edited by J. J. Conybeare, M.C., D.M. (Oxon.), F.R.C.P.; Seventh Edition; 1945. Edinburgh: E. and S. Livingstone Limited. 8¼" × 5¼", pp. 1184, with many illustrations and X-ray plates. Price: 30s. net.

[2] "Control of Pain in Childbirth", by Clifford B. Lull, M.D., F.A.C.S., and Robert A. Hingston, M.D., with an introduction by Norris W. Vaux, M.D.; Second Edition; 1945. Philadelphia: J. B. Lippincott Company. 9" × 6", pp. 376, with many illustrations. Price: 56s.

[1] "The Essentials of Chiropody", by Charles A. Pratt, Member of the Chartered Society of Physiotherapy; 1945. London: H. K. Lewis and Company Limited. 7¼" × 4½", pp. 168, with 34 illustrations. Price: 10s. net.

[2] "The Hair and Scalp", by Agnes Savill, M.A., M.D. (Glasgow), F.R.C.P.I.; Third Edition; 1944. London: Edward Arnold and Company. 8¼" × 5¼", pp. 314, with 50 illustrations. Price: 16s. net.

The Medical Journal of Australia

SATURDAY, MARCH 23, 1946.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

CLINICAL DISCIPLINE.

If one were asked to define discipline, the reply would probably be given that the word referred to the means by which practices, rules and regulations are enforced. This would be readily understood by every member of the community which has been regimented in many ways during the past five years in order that the war might be successfully waged. The voluntary submission of the people to discipline was one of the ways in which morale was kept at a high level. This probably was not so widely recognized as was the importance of discipline in the attainment of efficiency. In the ranks of the armed forces discipline must obviously be maintained, but there is no need, particularly in a country like Australia, to enlarge on the value of the intelligent planning of discipline if its ready acceptance is desired. When the term discipline is applied to the ordinary individual most people will think of a process of moral or mental training that will be a help in the everyday tasks of life. It is difficult to imagine any occupation in which discipline may be neglected without the sacrifice of valuable assets; and naturally the most important form of discipline is that of the self. The medical student, from the day that he embarks on his career at the medical school, comes under a form of discipline to which he will have to remain subject throughout the whole of his professional life. Many a member of the non-medical community has marvelled at the apparently sudden metamorphosis, on the conferring of a degree, of the irresponsible undergraduate into a sober-minded practitioner. For this change, which seems to take place almost overnight, the student has been undergoing years of training, of discipline, at the hands of teachers who have themselves been rooted and grounded and have grown to professional manhood in the traditions and usages of their predecessors through the centuries. The past five years have been years of stress, to some extent of short cuts and of make-shifts. If discipline has been more severe in some general directions, there is possibly an impression that in other spheres such as those of professional education and practice it has not been so necessary. The traditions of medicine, in regard to the kind of men who practise it and the type of service that they give, must be zealously guarded, both for the sake of medicine itself and also for the welfare and safety of the community. In regard to the larger questions of professional behaviour and general bearing there is not so much need to consider the question; but the work of the civilian practitioner has been so heavy, he has had so little time to give to each of his patients, that the discipline in clinical work may have become lax and may with advantage be considered. For this purpose reference will be made to three short articles that were published last year by Professor J. A. Ryle.[1]

Medicine, if it is held to include the whole study of disease in man and of man in disease, and particularly the applications of such study, can, Professor Ryle holds, hardly be called a science, although many sciences go to its making. Medicine is not an art, although it has often been so described and is often practised with the skill, imagination and sensitiveness which artists claim. In seeking for a definition, Ryle turns to the writings of Sir Thomas Lewis, and quotes him as looking on medicine as twofold—"theoretical" and "vocational". It was theoretical medicine with its rules of conduct which Lewis described as clinical science. Clinical science, Ryle explains, "is directed towards the advancement of knowledge by careful and ordered clinical observation, by the collection and analysis of factual data and by the application of physiological methods at the bedside, including experiments (which must not be harmful) carried out on healthy volunteers and patients". The vocational physician's primary concern is not considered to be the advancement of knowledge, but the diagnosis of disease and the care of the sick. But these are not rigid and final definitions; Ryle wisely qualifies them. Unless the man of clinical science handles the patient with the same sympathy and frankness and attempts at an understanding of his physical and mental needs as are expected of the vocational physician, and unless the patient is also made aware that he is helping to advance knowledge, Ryle is doubtful whether the clinical scientist should be wholly entrusted with the patient's care. In the same way Ryle expects of the vocational physician the same critical sense expected of the clinical scientist; and he thinks that the former fails in his mission unless he is as watchful of himself as he is of his patients, unless he is thorough in his examinations, keeps faithful records and corrects his errors. It is in this way that he may avoid giving way to the old temptation to claim as *propter* what is only *post* in his clinical work. From this it is clear that the clinical scientist and the vocational practitioner (let us call him the family doctor) have a broad common foothold in medicine. Both have to be humanists and both need a certain scientific outlook. With the clinical scientist, science must be developed in a high degree; the scientific method must figure prominently in his work, but his humanism must not be pushed into the background. He, as a matter of fact, has the more difficult task. The relation of humanism to science is an interesting subject; a discussion in which it is included will be found in THE

[1] *Guy's Hospital Gazette*, May 12 and 26, June 9, 1945.

MEDICAL JOURNAL OF AUSTRALIA of July 26, 1941. Readers are also referred to an article on realism and humanism in medical training in the *British Medical Journal* of June 16, 1945. But to return to our two types of medical practitioner—the clinical scientist and the family doctor—the point that Ryle makes and on which he bases all his remarks is that both have to cultivate a discipline. The definition of clinical medicine as a discipline is that which appeals to him most.

The next question to be determined is the nature of this discipline to which practitioners of medicine must submit, or which, in Ryle's words, they must cultivate—a much more willing idea than mere submission. Ryle thinks of a mould which must be fashioned to accept its disciplinary content, and he names one prepared by heredity, early upbringing and general education. These may be forthcoming in different degrees, and it is common sense to conclude that discipline cannot be accepted, much less cultivated, by a person entirely unsuited or unprepared for it. That is the chief reason why in these latter days, when admission to medical education is being granted to large numbers of young men and women and a selection has to be made, some means should be devised to select those who are likely to display the qualities of character and ability most to be desired in practitioners of medicine, in other words those likely to profit by clinical discipline and to cultivate it. The preliminary sciences give a student an insight into the problems of biology and the scientific method. This is the stage of thought in terms of local structure, departmental function and complex chemical activity. It is succeeded by one in which symptoms are studied, disease is seen in different manifestations in different subjects, and in which note is taken of the part that ignorance and fear can play in the creation or modification of some forms of disease. The psychological, the social and the economic causes of ill health are among the "ultimate" causes of disease which the student has to discover slowly for himself. The use of modern methods of investigation is not necessarily scientific. "Detailed physical investigation with the aid of these methods has become the order of the day, while the thorough clinical overhaul, the friendly and simple psychological enquiry, and the co-operation of the relative, the ward sister and the almoner as medical social worker is often what is really needed." No one will deny that Ryle is right when he insists that that judgement is most scientific which decides what methods of investigation are needed in any particular case, and that the treatment is most scientific which is best suited to the patient's need and takes into consideration all his circumstances. Ryle has a good deal to say about "system" as a part of clinical discipline and looks on it as necessary in three particular spheres: in the general arrangement of one's life and work, in respect of routine clinical methods and in the keeping of records. Most practitioners could, if need arose, write useful essays on each of these three aspects. This whole subject in fact is one for every member and prospective member of the profession who must think not only of their present attitude to medicine but also of future developments in the medical sciences that will call for study controlled by discipline. A final word must be added for the many practitioners who are too tired to think much about these things, but who before long will have to face them in a straightforward and fearless way. Ryle has some worthwhile observations on the maintenance of the doctor's personal health. With the return of more medical officers from active service many civilian doctors who need rest and recreation will be able to take a holiday. This will need to be done in a planned fashion and with the idea that it is part of the discipline essential to good work, and since every practitioner has a share in the building of the future, in the continual growth and advancement of medicine. We may conclude by quoting Ryle:

> Together the vocational and the theoretical physician can rebuild a discipline which has begun to disintegrate under the influence of a too rapid rate of advance. In the planning, sharing and fulfilment of their tasks they should not ignore the uses of historical retrospect and idealist philosophy. Interest alike in the good of the past and the better yet to be can inspire and balance thought and action, and help the growth of that scientific humanism which is the aim and purpose of all our medicine.

Current Comment.

THE AVAILABILITY OF VITAMINS IN VARIOUS FOODS AND PHARMACEUTICAL PRODUCTS.

IT is well known that foodstuffs are rarely absorbed completely from the human gastro-intestinal tract. In considering the nutritive value of a given food, therefore, one must allow for a coefficient of absorption, if accurate figures are required. This conception is important in such questions as that of the relative calorific value of white bread and wholemeal bread, for the carbohydrate and protein are not absorbed as completely from the latter as they are from the former. In the case of vitamins, the problem of absorption by human beings has been largely neglected. It has been difficult enough to obtain accurate figures of the vitamin content of foodstuffs, and, until recently, investigators have generally avoided the problem of whether chemically equivalent amounts of a vitamin, presented in two different foods, would be absorbed equally well. These problems are now being tackled by D. Melnick, M. Hochberg and B. L. Oser, who have recently published a series of papers on the physiological availability of vitamins for human beings.[1] The technique is such that only the water-soluble vitamins can be investigated, but the method nevertheless constitutes an important advance. Of recent years, laboratory animals have been used less and less in the assay of vitamins. Animal assays are tedious and inaccurate, but they did have the advantage of measuring the availability of the vitamin under consideration. Now, however, assays can be carried out on human beings with a smaller error than was possible with the older methods when animals were used, and it is likely that animal assays of the water-soluble vitamins will be superseded in studies on human nutrition.

The tests are based on the following principle: a normal human subject, living on an adequate diet, will excrete in his urine an amount of the water-soluble vitamins, or their derivatives, which is directly proportional to the quantity consumed. Riboflavin and thiamin are excreted as such in the urine; ascorbic acid is excreted partly in the unaltered form and partly as the oxidized form, dehydroascorbic acid; and niacin is excreted mostly as N^1-methylnicotinamide. Therefore, by measuring the output of these substances in the urine, it is possible to estimate the intake of the appropriate vitamin. If desired, all of these vitamins can be estimated concurrently. It is

[1] D. Melnick, M. Hochberg and B. L. Oser: "Physiological Availability of the Vitamins. I. The Human Bioassay Technic", *The Journal of Nutrition*, Volume XXX, 1945, page 67; "Physiological Availability of the Vitamins. II. The Effect of Dietary Thiaminase in Fish Products", *ibidem*, page 81; "Physiological Availability of the Vitamins. III. The Effect of Dietary Ascorbic Acid Oxidase", *ibidem*, page 193; "Physiological Availability of the Vitamins. IV. The Inefficiency of Live Yeast as a Source of Thiamin", *ibidem*, page 201.

desirable to use five subjects, preferably males, in any one test. The first step is to determine the urinary excretion of the vitamin under consideration during one full day on the basal diet. Next the subjects are given the basal diet, together with an aqueous solution of the vitamin, and the excretion of vitamin is again determined over a period of twenty-four hours. The difference between these two excretions gives the extra excretion resulting from the given test dose. A period of two weeks is then allowed to pass, and the experiment is repeated, except that the known test dose is replaced by the unknown foodstuff containing the vitamin, the availability of which is being determined. From this phase of the experiment one can obtain a figure for the extra excretion of vitamin resulting from the ingestion of a known amount of the test substance. The resulting calculation is simple. For example, in one test an estimation was made of the availability to man of ascorbic acid in a multivitamin tablet. The average basal excretion during the control period was 49 milligrammes per twenty-four hours, and this figure rose to 146 milligrammes per twenty-four hours when the subjects each ingested a pure solution containing 200 milligrammes of ascorbic acid. It thus became obvious that they excreted 48·6% of the test dose. After a lapse of two weeks, the basal excretion and the excretion after a test dose of the tablets were determined, and it was found that the subjects excreted 48% of the test dose. It is therefore apparent that the availability of the ascorbic acid in the tablets was 98·8%.

Using the above technique, Melnick, Hochberg and Oser made a study of the availability of thiamin in certain fish products. It is well known that some fish contain, in the raw state, thiaminase, which rapidly destroys thiamin *in vitro*. It was found that the ingestion of raw clams resulted in a considerable destruction of thiamin in the gastro-intestinal tract. In the test carried out, 50% of the dietary thiamin was destroyed. A similar study was carried out on the effect of ascorbic acid oxidase on the absorption of vitamin *C*. This oxidase is present in many foodstuffs containing ascorbic acid, and *in vitro* it may have a rapid and extensive effect. For example, 60% of the ascorbic acid in the basal diet was destroyed when the mixed diet was incubated at body temperature for six hours. It was found, however, that, when the subjects ate this basal diet, destruction of vitamin *C* did not occur in the interval between ingestion and absorption. Apparently the oxidase is quickly destroyed or inhibited in the gastro-intestinal tract. An interesting problem investigated by the same technique of human bioassay is the availability of thiamin in live yeast. It has usually been considered in the past that live yeast was a good source of thiamin. It now appears that the correct view is that live yeast contains large amounts of thiamin, but that only some 17% of this is available to human subjects.

Using the same methods as those outlined above, the authors have examined the availability to man of water-soluble vitamins in various pharmaceutical preparations.[1] Three types of product were examined in detail: (i) In the case of a multivitamin-mineral tablet, the vitamins were completely absorbed. Thiamin, in fact, was more completely absorbed from the tablet than it was from a pure solution of the vitamin. This was presumably due to an enhanced stability, in the gastro-intestinal tract, of the thiamin in the tablet as compared with the thiamin in solution. (ii) In the case of a tablet protectively coated with a water-insoluble enzyme-resistant film, the absorption of the more soluble components (ascorbic acid, thiamin and nicotinamide) was not interfered with, but the absorption of riboflavin was reduced by about half. (iii) A capsule containing a fuller's earth adsorbate of thiamin yielded only about 35% of its thiamin content. The fuller's earth retains the thiamin tenaciously.

Further papers from this group of workers are promised. They will repay careful study by anyone interested in human nutrition.

[1] B. L. Oser, D. Melnick and M. Hochberg: "Physiological Availability of the Vitamins: Study of Methods for Determining Availability of Vitamins in Pharmaceutical Products", *Industrial Engineering Chemistry* (Analytical Edition), Volume XVII, July, 1945, page 405.

PENICILLIN AND THE SKIN.

THAT penicillin has been exploited in the treatment of infective skin conditions is exemplified in several of the "abstracts" published in another page of this issue. The latest report is one of a "therapeutic trial" of penicillin carried out by J. H. Twiston Davies, Kendal Dixon and C. H. Stuart-Harris.[1] The conditions dealt with by them included annular impetigo, sigilliform impetigo, ecthyma, furunculosis and impetiginized seborrhœa and seborrhœic dermatitis. In most cases penicillin was applied as an aqueous spray containing 1,000 units per millilitre. Only in annular (staphylococcal) impetigo was penicillin much superior to other remedies. In seborrhœic dermatitis, which was the main type of pyoderma treated, penicillin was no more effective than other remedies. In some cases penicillin gave very good results, but these were unpredictable, and sometimes inferior results were forthcoming. In no case was penicillin harmful. In ecthyma penicillin compared unfavourably with other remedies. The most interesting feature of the work was that the success or failure of therapy could not be correlated with the flora isolated. In spite of treatment, organisms sensitive to penicillin could usually be recovered from the lesions after three days of treatment. In some cases staphylococci resistant to penicillin appeared during treatment, and this happened oftener as treatment was prolonged. These cases as well as a few in which organisms resistant to penicillin were present before treatment was begun, were on the whole refractory to penicillin treatment. At the same time our authors point out that the appearance or the initial presence of staphylococci resistant to penicillin was not the general cause of resistance to penicillin treatment, because in many refractory cases fully sensitive staphylococci were repeatedly recovered from the lesions after prolonged spraying as well as after intramuscular therapy. Davies and his co-workers are disappointed at the results. (Compare the results claimed by Cohen and Pfaff in the abstract mentioned above.) They have set an interesting problem. One suggestion to account for the failure of the penicillin therapy has to do with the depth of the lesions. Another is that the disease is often due to the interaction of ætiologically different factors; such a factor might be the hypothetical cause of the seborrhœic state. Davies and his collaborators mention other authors who have found that success with various substances in impetigo is unrelated to bacteriological findings. Clearly much work remains to be done, not only on the action of penicillin in varying circumstances in different maladies, but also on the different factors operating in the maladies themselves.

A TWENTY-FIFTH ANNIVERSARY.

THE AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY has celebrated its twenty-fifth birthday. This happened in October last, and the issue for December, 1945, celebrates the occasion. In 1919 the *American Journal of Obstetrics and Diseases of Women and Children* ceased publication after a career which began in 1868; the *American Journal of Obstetrics and Gynecology* is its successor. From its title page we learn that it is the official organ of no less than nineteen associations and societies. The past twenty-five years have seen many changes and developments in both obstetrics and gynæcology; these have been recorded in the pages of the journal. The advances of recent years have resulted from study, experiment and research in ward and laboratory, and the basic sciences have yielded their share to the present state of knowledge. Obstetrician and gynæcologist must therefore be students of an ever-widening field. The *American Journal of Obstetrics and Gynecology* is one of the aids on which practitioners in every part of the English-speaking world may rely. For the whole of its life the journal has been under the continuous editorship of Dr. George W. Kosmak. To the organization controlling the journal and to its editor we offer our warm congratulations and our good wishes.

[1] *The Quarterly Journal of Medicine*, October, 1945.

Abstracts from Medical Literature.

DERMATOLOGY.

Penicillin in Dermatological Therapy.

H. M. COHEN AND R. O. PFAFF (*Archives of Dermatology and Syphilology*, March, 1945) report on the results obtained in 100 cases in which penicillin was used in dermatological practice. In dermatological therapy there are two methods of administering penicillin: (i) local administration in the form of solutions and ointments; (ii) intramuscular injection. A penicillin ointment was used for local application. The authors first used 100,000 Oxford units to one ounce of ointment base. Later they found that 50,000 units to one ounce of ointment base produced the same therapeutic results as the more concentrated product, and this strength was subsequently used in all cases. The ointment base consisted of 50% hydrous wool fat and 50% rose water ointment. Intramuscularly the authors gave 20,000 units every four hours. To determine the irritating qualities of penicillin when applied locally to the skin, 524 patients were selected at random in hospital, and patch tests were performed with the ointment. None of the patients had a positive reaction at twenty-four hours and at forty-eight hours, and five had a positive reaction persisting for periods varying from forty-eight hours to one week—an incidence of 0·95%. The diseases treated were classified in the following five groups: (i) *acne vulgaris*, (ii) pyoderma, (iii) eczema, (iv) so-called tropical ulcer, (v) miscellaneous. *Acne vulgaris* with superimposed painful infection was treated by intramuscular injections of 200,000 units of penicillin. Of 32 patients so treated, only one showed decided improvement, the condition of 11 others was slightly improved, 19 showed no change, and one looked worse after treatment. The authors consequently think that penicillin is of little use in the treatment of acne. As a group, the patients suffering from pyoderma presented the most promising field for penicillin therapy. The use of penicillin for impetigo is indicated in the following circumstances: (i) when sensitivity to mercury or sulphonamide compounds is present; (ii) when the lesions are resistant to treatment; (iii) when rapid cure is imperative. In folliculitis the results obtained with penicillin are questionable. One carbuncle was treated with penicillin ointment after incision and drainage. Within twenty-four hours after penicillin ointment had been applied to the crater, no pus was evident. Healing was rapid. In the treatment of dermatophytosis with streptococcal pyoderma, 200 units of penicillin were given intramuscularly, and penicillin ointment was applied to the open lesions. The results were excellent. The rate of recurrence after penicillin therapy was greatly reduced. One patient suffering from severe *herpes zoster* with infection rapidly responded to the penicillin ointment. The results obtained with penicillin in the treatment of *sycosis barbæ* were satisfactory. Penicillin ointment, from the authors' observations, is indicated in infectious eczematoid dermatitis. The results of treatment of so-called tropical ulcers were good. Moniliasis also responded favourably to penicillin ointment.

Vitamin Therapy in Dermatology.

M. E. OBERMAYER AND K. FROST (*Archives of Dermatology and Syphilology*, May, 1945) point out that vitamin therapy in the dermatological field is used for a variety of diseases, which may be divided into two groups: (*a*) the true and established vitamin deficiencies and (*b*) dermatosis in which a true vitamin deficiency is either debatable or undemonstrable, but for which vitamin therapy appears to be of benefit. Some dermatoses of the latter group are the subject of the authors' discussion. In most dermatological diseases which yield to treatment with vitamins infinitely higher doses are required than are provided by dietary measures or by the administration of commercially advertised vitamin concentrate mixtures. An important and as yet not generally recognized effect of a high intake of vitamins *A*, *C* and *D* and the *B* complex is its aid in the control of the allergic state. Stokes has expressed the opinion that it may be due in part to the action of the vitamin *B* complex in the intestinal tract and perhaps to the anti-dermatitis and hyperchlorhydria-preventing fractions. In this connexion it is interesting that the heterogeneous group of chronic inflammatory dermatoses which Cross reported were beneficially affected by vitamin *B* complex therapy, was characterized by low gastric acidity. Vitamin *A* may be beneficial in the treatment of diseases characterized by excessive or abnormal keratinization, either follicular or diffuse, even when the underlying inflammatory dermatosis does not in itself appear suitable for this form of therapy. Striking results were obtained with the administration of vitamin *A* in two cases of unusually hyperkeratotic *lichen simplex chronicus* in which other treatment had proved ineffective. Vitamin *A* therapy has also been of benefit in the handling of some forms of *acne vulgaris*. The use of the vitamin *B* complex is recommended for the management of dermatoses in which allergic factors are involved. The beneficial effect may be due to the antiachlorhydric fraction. Cheilosis was formerly believed to represent uniformly a riboflavin deficiency, but it is emphasized that factors unrelated to vitamins, such as epithelial hypersensitivity and anatomical conditions, for example, the shape of the mouth, in others improperly fitting dentures, may be important in its genesis.

Allergic Reactions during the Administration of Penicillin.

J. HENDERSON (*Archives of Dermatology and Syphilology*, August, 1945) states that Jadassohn, Scharf and Sulzberger and their collaborators found that products of fungi were capable of producing anaphylactic shock in guinea-pigs and found that the uterine horn of a guinea-pig (Schultz-Dale reaction) was sensitized to these extracts. They were also able to elicit immediate reactions in cutaneous sites passively sensitized by a previous injection of serum containing Prausnitz-Küstner antibodies to trycophyton. By use of the Schultz-Dale phenomenon these investigators found that extracts prepared from various species of dermatophytes all showed a common antigenic factor. It is now an ascertained fact that all extracts of the hyphomycetes contain, in addition to the allergic fractions peculiar to each particular species, a powerful allergenic principle common to and characteristic of all. Dermatologists who are cognizant of the many explosive reactions from fungous toxins, such as bullous eruption of the hands and feet, generalized "ids", erysipelas-like trycophytic manifestations and many others, have watched with interest those patients who were being treated with the new drug penicillin. The sites in which the fungi usually manifest themselves have been carefully and frequently examined for evidence of any change in local tissue resistance or of allergic reactions to the common hyphomycetic allergin in penicillin. The author observed two cases in which almost identical reactions occurred during the administration of penicillin. After the administration of penicillin for several days a vesicular eruption appeared on the genitals and on the web of the fingers and spread to the crural region. The itching was severe. The second patient also had a vesicular eruption on the webs of the toes. The first patient said that he had never had dermatophytosis of the feet or any crural infection from fungus. The other had a history of previous dermatophytosis of the feet. The pruritus abated promptly after penicillin therapy was stopped. An intradermal test with penicillin did not produce any reaction in the first case; an intradermal test with trichophytin gave no reaction, but an intradermal test with oidiomycin gave a strongly positive reaction in forty-eight hours. In the second dose an intradermal test with 0·1 millilitre of freshly prepared penicillin containing 1,000 units produced in sixty hours a vesicle with an erythematous base. Intradermal tests with trichophytin and oidiomycin gave negative results. The author suggests that patients selected for penicillin therapy should be closely questioned about previous reactions to fungi. Those reporting reactions to fungi should be tested with from 500 to 1,000 units of penicillin intradermally. If a bullous lesion appears at the site of injection, extreme caution should be used in the administration of penicillin. If a history of chronic infection is elicited, great care should be taken during the administration of penicillin to areas subject to mycotic infection.

Hæmangioendothelioma of the Skin.

M. R. CARO AND C. H. STUBENRAUCH (*Archives of Dermatology and Syphilology*, May, 1945) state that examples are occasionally seen of tumours of the blood vessels which histologically show great cellular activity, but which follow a benign course. Thereafter, however, vascular tumours are encountered which seem histologically benign, but which in time metastasize and eventually cause death. A simple grouping based on both clinical and histological features would divide such tumours into (*a*) hæmangiomata, which are benign clinically and histologically; (*b*) hæmangioendotheliomata, in which histologically there is seen proliferation of endothelial cells and clinically a gradation from a benign to a malignant course; and (*c*) malignant endotheliomata, in which malignancy is

evident clinically and histologically. The authors report a case in detail. A diagnosis of hæmangioendothelioma cannot be made on clinical grounds alone, for the tumour may vary in appearance from a small pedunculated nodule to a large invasive mass. In general these tumours are soft, dark red and raised above the surface of the skin, and they grow slowly but progressively. Pigmentation is often present because of the tendency to bleeding within the tumour. The response to X-ray or radium therapy is generally poor. There is a tendency to recurrence after excision, and metastases when they occur are late in the course of the disease. The diagnosis may be made most conclusively on histological examination. The tumour is composed of masses of endothelial cells and vascular tubes which in places are lined with several layers of endothelial cells and which exhibit a tendency for these lumina to anastomose. Hæmangioendotheliomata must be differentiated from hæmangioma, *granuloma pyogenicum*, malignant endothelioma and idiopathic multiple hæmorrhagic sarcoma of Kaposi. Hæmangioma generally appears early in life and histologically is composed of dilated capillaries which are filled with blood and generally lined by a single layer of normal endothelial cells. *Granuloma pyogenicum* frequently appears at the site of an injury, grows rapidly to produce a tumour that is pedunculated or sessile, and bleeds readily to develop a crusted surface or one covered by a purulent exudate. Histologically there is considerable proliferation of young blood vessels which are lined by a single layer of endothelium. Often there is a diffuse infiltrate throughout the stroma containing many polymorphonuclear leucocytes, but in some cases there is sufficient proliferation of fibroblasts to make the differentiation from hæmangioendothelioma difficult. Malignant endothelioma cannot always be readily differentiated clinically or histologically from hæmangioendothelioma. In the former, however, there is a great predominance of cellular elements, but there is very little tendency for the development of vessels, and mitotic figures are more frequent. In Kaposi's sarcoma the lesions begin as bluish red stains in which a definite infiltration soon develops. The hands and feet are the areas most often involved at first. The lesions enlarge slowly to produce deep firm nodules.

UROLOGY.

Aluminium Hydroxide Gels in Renal Calculus.

E. SHORR (*The Journal of Urology*, April, 1945) states that the administration of "Amphojel" (a trade form of aluminium hydroxide gel) diverts to the alimentary tract for excretion 90% of the phosphates normally excreted in the urine. When this drug is taken by mouth, a highly insoluble aluminium phosphate is formed in the gut and is excreted as such in the stools. The dose required to secure the full effect for such patients as those immobilized by fractures *et cetera* is about 30 to 40 millilitres taken by mouth every six hours. The method, as well as being valuable as a prophylactic against alkaline stone formation, is also useful when an alkaline urine is infected with urea-splitting germs. In such cases, even an acid-ash diet *plus* acidifying agents usually fails to alter the reaction. However, with "Amphojel" the excretion of phosphate ions is profoundly lowered and the acidifying agents and diet have their opportunity. If acidification is possible in such cases it may be that in future it will be possible to dissolve calcium and phosphate ions out of any alkaline calculi which are present. An additional help is the temporary administration of œstrogens. When the nipples (in the male) become slightly sensitive, treatment is discontinued till they are normal, when it is resumed. Œstrogens cause increased excretion of citric acid in the urine. This reduces the number of calcium ions participating in the precipitation of calcium phosphate, replacing them with a weakly ionized soluble calcium citrate complex. The amount of phosphorus ingested by the patient is reduced by introducing the following articles of diet: nuts, dried apricots, barley, rice, dried beans, wholemeal bread, hard cheese, cocoa, lentils, liver, dried peas, sweetbreads, kidneys, heart, fish roe, sardines, "Bovril".

Ureteric Obstruction in Children.

C. J. E. KICKHAM (*The Journal of Urology*, June, 1945) sees a great vista for preventive urology in the early diagnosis and prompt treatment of diseases and abnormalities of the urinary tract in early life. A large percentage of these conditions have a congenital background. When adult life is reached the penalty for the neglect of early treatment is the common sacrifice of a kidney by nephrectomy when an earlier plastic operation would have rendered this unnecessary. Likewise, many a case of pyelitis of pregnancy is but the recrudescence of an infection in childhood with an underlying basis of obstruction in some part of the ureter. Chronic unilateral renal infections, if allowed to smoulder quietly for years, may finally be the cause of hypertension leading to the sacrifice of the affected organ, the basis again being some form of congenital obstruction. There is no longer any excuse for the clinician who neglects pathological study of the urine, plain skiagrams and excretion urograms. Now that the urologist has the delicate child cystoscope designed by Butterfield, Young, McCarthy and Campbell, he has no excuse for neglecting full retrograde pyelographic study. A urinary infection which does not respond promptly and fully to drug treatment calls for special study. Obstruction may occur anywhere from the external meatus to the uriniferous tubules, but the ureter is the commonest site. A urinary infection should not be considered cured until the specimen is normal when examined microscopically and by cultural methods. Symptoms of vesical irritation, the so-called enuresis, which do not respond to a reasonable period of medical therapy should be investigated fully. Abdominal pain of ureteric origin is frequently attributed to appendicitis. Many a young adult who comes up for treatment of hydronephrosis has a tale-telling appendicectomy scar. The ultimate goal of all renal surgery except in tuberculosis and malignant disease is to conserve renal tissue if there is no undue hazard in so doing. The tendency to bilateral involvement in hydronephrosis makes it imperative to attempt plastic surgery to relieve obstructions at and near the upper end of the ureter. For stricture of the upper portion of the ureter a Rammstedt type of operation is best. For stricture at the uretero-pelvic juncture, the Foley modification of Schwyzer's Y incision, with V closure; for high implantation of the ureter, Gibson described an operation in 1940 in which the valve-like partition is incised and the cut edges are left unsutured.

Spinal Analgesia in Treatment of Anuria.

R. D. MARGRAVES AND E. BOGEN (*The Urologic and Cutaneous Review*, May, 1945) state that the value of spinal analgesia in the relief of reflex intestinal obstruction has been attested by numerous observers. It might be expected to relax reflex spasm in other muscular organs, but few reports of such are available. A case is reported of a man, aged twenty-nine years, with anuria of three days' duration thought to be of reflex origin from a median bar bladder neck obstruction. Catheterization revealed an empty bladder and all the routine intravenous and other measures failed to stimulate renal secretion. Preparations were made to repeat endoscopy of the bladder and even to perform nephrostomy, and to this end spinal analgesia, high enough for the latter purpose, was induced. As soon as the analgesia was produced the patient relaxed and abdominal distortion was relieved by the passage of flatus. Only fifteen minutes later on the passage of a cystoscope 150 millilitres of urine were drawn from the bladder, and after that the urinary secretion rapidly increased, but the blood urea content and the temperature rose. The patient was accordingly given more glucose intravenously and also penicillin, and the following day he was well, with a low blood urea content and good secretion. Later excretion pyelograms revealed a ureteric calculus on each side and treatment was then directed to this obstruction.

Transurethral Prostatic Resection.

L. F. GREENE (*The Journal of Urology*, August, 1945) states that the introduction of endoscopic prostatic resection has removed one of the chief contraindications to prostatic surgical treatment, namely, advanced renal insufficiency. Patients with this serious complication are no longer condemned to lead catheter life. The important features of the management in such cases are the following: (i) Improvement or restriction of the acid-base metabolism by suitable intravenous infusions and treatment of anæmia by blood transfusions. (ii) Maintenance of a urinary output of 2,000 to 3,000 millilitres daily, thus causing a fall in nitrogenous waste products in the blood. (iii) Drainage by urethral catheter for as short a time as possible. Suprapubic cystotomy with its attendant mortality is not necessary. (iv) Operation to be done as soon as the blood urea concentration is shown to be no longer rising, but to have become stabilized. (v) Completion of the resection within forty-five minutes.

British Medical Association News.

NOTICE.

THE General Secretary of the Federal Council of the British Medical Association in Australia has announced that the following medical practitioners have been released from full-time duty with His Majesty's Forces and have resumed or will resume practice as from the dates mentioned:

Dr. J. P. Lyttle, 78, Bradley Street, Goulburn, New South Wales (February 11, 1946).

Dr. A. D. J. Frost, 16, Birriga Road, Bellevue Hill, New South Wales (March 18, 1946).

Medical Societies.

THE PUBLIC MEDICAL OFFICERS' ASSOCIATION OF NEW SOUTH WALES.

THE twentieth annual general meeting of the Public Medical Officers' Association of New South Wales was held at British Medical Association House, 135, Macquarie Street, Sydney, on January 29, 1946.

There were 28 members present and Dr. E. T. Hilliard (President) was in the chair. Eight members sent letters appointing proxies, of which seven were accepted as valid.

Financial Statement.

The Honorary Treasurer, Dr. G. C. Smith, presented his financial statement for the year 1945. It showed receipt of £36 12s. 1d. and expenditure of £12 14s. 1d. The total funds on December 31, 1945, were £667 4s. 4d.

Annual Report.

The Honorary Secretary, Dr. H. H. Willis, explained the annual report which was adopted. The report is as follows.

The year 1945 has seen the termination of the German and Japanese wars and the commencement of the civil turmoil that so often follows in the wake of wars. The Committee has in these circumstances felt obliged to adopt a firmer and more aggressive line of action in the furtherance of the Association's objects. This has brought it into conflict with authorities who ordinarily resist our efforts, and this in turn calls for the utmost loyalty of members of the Association.

The Committee met nine times during the year, the attendances of members being as follows:

Dr. E. T. Hilliard (President) ..	6
Dr. S. Evan Jones	8
Dr. A. T. Edwards	8
Dr. C. E. Percy	7
Dr. G. C. Smith	9
Dr. J. McManamey	8
Dr. J. McF. Rossell	5
Dr. Dorothy McClemens	5
Dr. W. K. Flook	9
Dr. H. H. Willis	9

There are now 112 members on the roll of the Association, of whom 10, having retired from the public services, are honorary members. The Committee regrets having to remove the names of several of the older members who had become unfinancial. To enable the Association to achieve its aims, a large, loyal and enthusiastic membership is necessary. To ensure this, members are asked to recruit new appointees to the services.

Early in the year a reply was received to our representations for government protection of our members, especially those in mental hospitals, against vexatious litigation. The Premier of New South Wales has expressed unwillingness to alter the law or the present procedure in such cases. A promise has been given, however, that radiological and surgical and other specialist services will be made more freely available to our members in the course of their departmental duties.

Our relations with the New South Wales Branch of the British Medical Association remain cordial. The Council of that body is willing and anxious to assist us in our efforts to secure better conditions for salaried medical officers, but as yet has not been able to effect anything in that direction.

It was decided to take no action, as an association, towards reform of the New South Wales Branch of the British Medical Association, leaving it to individual members to take such action personally as they might think fit.

The Public Service Board agreed to receive a deputation from the Association to discuss salaries and conditions of employment of medical officers in the New South Wales State services. On meeting the Board on March 14, 1945, our delegates were informed that the Board had already decided the matters at issue, but were allowed to make extempore comments on a new scale of salaries which became operative on April 1, 1945. This salary scale and the conditions attached to it have caused disappointment and dissatisfaction amongst our members. It would seem that the Public Service Board's sole desire is to obtain medical officers at the cheapest possible rate, irrespective of efficiency, ability or qualifications. Moreover, the introduction of arbitrary bars to promotion is considered objectionable. An attempt to appeal to the Minister for Health against the Public Service Board has been unsuccessful.

An amended scale of salaries remedying some anomalies has been received from the Board and was submitted to members for their consideration.

Our relations with other service organizations remain cordial. The Committee has decided to cooperate with other public service organizations in an agitation to secure abolition of the means test for eligibility for the old-age pension, but declined to cooperate in a movement to secure additional benefits for those who retire from the services before sixty-five years of age.

Election of Office-Bearers.

The following officers of the Association were elected for the ensuing year:

President: Dr. W. K. Flook.

Honorary Secretary: Dr. H. Hastings Willis.

Honorary Treasurer: Dr. Gordon C. Smith.

Honorary Auditor: Dr. S. McGeorge.

Committee: Dr. W. K. Flook, Dr. Dorothy McClemens (Education Department), Dr. J. McManamey, Dr. C. E. Percy and Dr. G. C. Smith (Health Department), Dr. A. T. Edwards and Dr. E. T. Hilliard (Mental Hospitals), Dr. George Saxby (Repatriation Department), and Dr. J. McF. Rossell (Works and Railways).

Other Business.

Dr. Noel Kirkwood moved, pursuant to notice on amendment of the rules, to provide that one representative of medical officers in mental hospitals be elected by deputy superintendents and those of higher rank and one by medical officers in the lower grades. It failed to secure much support and was withdrawn in favour of a motion calling upon the committee to devise a new method of electing members of the committee. On being put to a vote, this motion was lost.

Dr. E. L. Morgan moved that the Association accept an offer from the New South Wales Public Service Board of an agreement covering salaries of medical officers for a period of three years from July 1, 1945. After much animated discussion this was carried by 23 votes to 7, but with an *addendum* that strong representations be made to the Board concerning the application of the new scale to officers in junior grades.

On the motion of Dr. McManamey the committee was instructed to make further representations to the Public Service Board concerning conditions of service, notably quarters and leave.

A motion by Dr. Stevens that a deferred discussion on the desirability of registering the Association as a trade union and industrial union be further deferred for twelve months was carried unanimously.

A further motion by Dr. Stevens instructing the committee to issue a statement of facts concerning matters for discussion at the annual general meeting one month before the meeting was lost.

A hearty vote of thanks to the retiring President for his services during a difficult year concluded the business of the meeting.

Obituary.

HERBERT MICHAEL MORAN.

We are indebted to Dr. E. H. Molesworth for the following appreciation of the late Dr. Herbert Michael Moran.

H. M. Moran, or as he was commonly called, Paddy, by his colleagues, though not by his family, was one of the most remarkable and learned members of the medical profession in Australia throughout its history. He was not only learned in medicine, but in the literature of three languages, English, French and Italian. More than that, he was a Rugby footballer of international performance. In 1908 he captained a team of Australian rugger players on a visit to England. Unfortunately he injured his shoulder early in the tour and could not play in the later games. Dr. H. Bullock, who played as breakaway on the opposite side of the scrum from Moran for University and New South Wales, and who like so many who knew him well will cherish a lasting brotherly love for him, told me recently that Moran was the fastest man for thirty yards he had ever seen. When the ball was gained by the opposing side and the half-back passed it to the five-eighth, who then sent it on to the centre three-quarter, one or the other of these

last two was often amazed that with the ball he also received a paralysing tackle from Moran. Space will not permit me to say more than that he was a great footballer—except this, that when he was in possession of the ball and you tackled him above the knees you either got a neck shattering fend or a bump from a hip that felt like a sledge-hammer. I know, because, though never in his class as a footballer, I have often experienced both shocks in minor games.

But great as was his career as a footballer, it was a trifle as compared with his medical and literary attainments. His Irish blood inspired his first enthusiasm to right the wrongs of Ireland. When the football season of 1908-1909 in England was over he went hotfoot to Ireland to see for himself. He spent about four to six months there, worked in the Rotunda in Dublin, and came back to London cured of his enthusiasm for righting the wrongs of Ireland. I remember well him saying to me: "I am an Australian, but those people over the Irish Channel from whom I sprang will never be satisfied whatever is done for them. I can never take their cause seriously again." He then went to Edinburgh, and in a surprisingly short time got his F.R.C.S.E. Then he came back to London for further experience. While there he shared diggings with H. R. G. Poate, A. J. Mackenzie, Burton Bradley, George Paul and myself. The occupants changed from time to time as one went back to Australia, and someone else arrived. I spent a lot of my time on the Continent, being ordered here and there by my old chief, Dr. Arthur Whitfield. Moran also came over to France, but, as far as I can remember, not to Germany or Austria. But the French language and literature charmed him, and so was laid the foundation of his next enthusiasm which was for French science and literature. On our return to Sydney in 1910 he would not come with me forthwith into Macquarie Street, but did about two years in general practice in Balmain for general experience. During the 1914-1918 war Moran served with the Royal Army Medical Corps as a lieutenant and saw service in the Mediterranean and later in Mesopotamia. He contracted dysentery in a very severe form and was invalided out, I think, before the end of the war. On his return he came into town to do consulting work, but he was already inspired with the idea of surgical application of radium. He went again to Europe, and studied at the *Institut de Radium* under Regaud and Lacassagne. Then came his next great enthusiasm, and for a while he would talk of nothing but French science and literature. His enthusiasm for English literature did not fade. At that time English medicos did not accept the principles of radium treatment as laid down by Regaud. Later, on a third trip I think, he went to Oslo and studied radium work as practised there. On his return from Oslo he got me to join him in collecting a large sum of money for cancer research and treatment. We went out to see Mr. David Benjamin, who was head of a big clothing store in Newtown, an industrial suburb close to the city of Sydney, and managed to interest him in the project. He was a first-class collector of funds, and I think the amount subscribed to the Cancer Research Fund of the University of Sydney was £120,000. The story of the failure of the project is told in the chapter called "Cancer and Chaos" in Moran's first book, "Viewless Winds".

Well, the organization came to an end, but Moran went on with his hospital and private practice of treating cancer by radium or surgery. Those patients whose interests would be better served by X rays, superficial or deep, he sent to others.

There can be no doubt that H. M. Moran was the pioneer of surgical application of radium and the first practitioner to use this weapon by scientific method in Australia, if not in the Empire. But practitioners used to flood his rooms with hopelessly advanced cases, and to turn these people down, to read death sentences every day broke him down. He finally gave up practice entirely, resigned from the Medical Board and all his clubs, and went off on another of his many trips to Europe about ten or twelve years ago. In the meantime he had developed a new enthusiasm for Italian literature, and, as he always did, he translated this into an enthusiasm for Italian people and methods. He went to Italy and stayed there with occasional breaks to enable him to visit Germany and Spain. He even succeeded in getting himself appointed as a sort of medical observer to the Italo-Abyssinian war. His letters contained very caustic comments on the military hygiene of the Italian army. However, he retained for a while some of his enthusiasm for things Italian, and he was an interested observer of the progress and social results of fascism. But, as his letters showed, this was fading rapidly, and, indeed, was only born of his very real fear of communism. At any rate, when war broke out between England and Germany in 1939 he left Italy at once and went through France to England, where he joined the Royal Army Medical Corps again. He was appointed first a lieutenant, but was suddenly promoted to lieutenant-colonel. The work given him was not very congenial, namely, that of chairman of a board to determine whether certain soldiers were to be discharged or not.

It was while he was in Italy and later in the Royal Army Medical Corps during the recent war that he wrote his second book, "Beyond the Hill Lies China", and a third book, which is to be published posthumously. The third book is to be called "In My Fashion". It has been suggested with right that his almost immediate appointment to a lieutenant-colonelcy showed definitely that accusations to the effect that he was pro-fascist were not shared by the authorities in Great Britain, and even provided strong evidence to the opposite theory that he served a purpose useful to Britain during the years he lived in Italy.

It was while he was still in the Royal Army Medical Corps that he had an operation performed for a mole, but the pathological report showed not only that it was not completely removed, but that it was already malignant. But in all his letters to various friends he wrote no word of complaint. It was the irony of fate that he should be attacked by malignant disease against which he had fought so hard and so long, and that the particular variety of growth should have been one which was not amenable to his favourite form of treatment by radium or X rays.

He was a colossal reader of literature, medical and otherwise, in three languages—English, French and Italian. He also spoke and read German and Spanish, though not so freely. He could also remember where he read certain papers on innumerable subjects. This made him a dangerous opponent in debate against a speaker who made rash or inaccurate statements in support of his claims, because Moran could give authority from memory for his opinion that such claims were baseless.

But it will be by his enviable capacity for writing beautiful English prose, and by his books, "Viewless Winds", "Beyond the Hill Lies China" and (almost certainly) "In My Fashion", that he will be remembered longest.

He has made a gift to the University of Sydney to found a prize for an essay on "The History of Medicine and Science". It is proposed to collect the numerous letters which he wrote to various close friends and to publish them after elimination of personal and family references. Those that he wrote to me contain a lot of intensely interesting matter, and I am sure that the volume will have a big sale. Any royalties are to go to the fund which Moran himself started and go to increase the value of the prize for medical history.

Well, Australia has lost one of her great figures in medicine. It is not that he was the best surgeon, though his surgery was excellent, or that today there are not men as good or better than Moran was in his most active period, but that seldom has anyone combined as he did excellence of pioneering medical work with excellence of literary achievement and with a knowledge of four languages (and their literature) beside his own.

His wife and son were with him when he died, and they have both written to me to tell me how peaceful was his end. His son, Patrick, has high mathematical qualifications from Sydney and Cambridge, and having been engaged in some very hush-hush scientific work by the War Office, he now has been awarded some sort of fellowship in Saint John's College, Cambridge. So it is more than probable that he will carry with distinction the flag which his father bore so nobly during his life.

Correspondence.

POLITICS AND THE MEDICAL PROFESSION.

Sir: Dr. O'Day's interesting letter on this subject (February 23, 1946) appears confused. (*a*) If "medicine, like all science, is materialist", and "spirit is the junction [? function] of certain highly organized forms of matter", then what he calls "spirit" falls within the scope of science, and the antithesis he presupposes is unnecessary, and therefore not conducive to freedom. (*b*) "Wickedness" as a factor in ill health may demonstrate itself in ways which vary with the perception of the "wickedness". If the "wickedness" be perceived by one individual and referred to himself, dysfunctions of his "highly organized forms of matter" have been recognized by science. If the "wickedness" be perceived by others and referred to an individual, that individual may experience the extreme of ill health, that is, death, as did Mussolini. At the time of the examination referred to, he was not a healthy man. He was a corpse.

Yours, etc.,

61, Collins Street, Melbourne,
February 28, 1946.

Alice Barber.

Sir: If by "a scientific consideration of those problems" Dr. Gerald O'Day means the interpretation of words and terms into that which they rightly signify, it may, perhaps, be asked if his own philosophy in the issue of February 23 will not also bear some close scrutiny as well as Dr. John Dale's, for his remarks in regard thereto are far from convincing when thus measured.

Nationalization is, truly, distinct from socialization, for the former word suggests conduct whereby some additional territory, property or otherwise, or persons, are acquired and absorbed by a nation, and, in the case of a person, such then becomes "a national" of the State concerned—that is, one takes out naturalization papers in order to become duly nationalized and thus identified in such respect. But socialization applies, surely, to the resumption of some organization already existing within the country in question, and includes not only persons but the property owned and administered thereby as well. Although these terms are invariably used as one, it is, therefore, socialization—and not nationalization—that can be illustrated by "the taking over by a capitalist State of some business, for example, the post, the railways, or the mines, etc."—that is, the government class "taking over" some such business from private enterprise.

What, then, does Dr. O'Day mean by his term "a capitalist State"? Obviously, the words "the State" and "capitalism" require correct definition.

The State signifies the whole community or nation of the country concerned, and which is divisible into (*a*) the government class, (*b*) the rest of the community who pay taxes thereto and are legally controlled thereby and whether in a reasonable or unreasonable sense. Should, then, the existing government class "take over some business", they do so from some private enterprise activity, and thus enlarge their ranks and powers at the expense of the rest of personally owned and conducted industry, and the ordinary government control thereof is at once replaced by government ownership and administration thereof, and which is rightly termed socialization in due deference to the philosophy termed "socialism" with its well-known slogan "the socialization of production, distribution and exchange", and which, when brought to its logical conclusion, means dictatorship and autocracy on the part of the government class with more or less complete subservience on the part of the rest of the community, for the government class then become a vast monopoly that brooks no criticism or interference from the rest of the nation.

"The State" therefore—that is, signifying the whole community or nation—cannot be confused with (*a*) the government class (part of the State), or again with (*b*) the body politic which includes everybody and everything under the suzerainty and jurisdiction of the country concerned.

Once anything is socialized—that is, for instance, railways, banks, airways, coal mines or any other industry—everything in regard thereto is for all practical purposes owned and administered by the government class and not by the whole community as people fondly imagine. Then come for consideration the issues of (*a*) profitable economy from both a local and national point of view, and (*b*) the rights of citizenship that are democracy. The word "capitalism" implicates the capitalistic system of production, distribution and exchange, money and the gold standard, the only alternative to which is barter and savagery. The Soviet Union practises capitalism equally as the democracies, but their system of government is essentially an autocracy—that is, the government class reign supreme and control the whole body politic (people and property) otherwise.

It is the government class, therefore, and not "a capitalist State", that can "take over some business", previously owned and run by private enterprise, and this rightly occurs in certain spheres of industrial activity, but when unduly elaborated destroys the freedoms that constitute democracy and in its place reverts back to an autocratic dictatorship and the slave State, and that, again, inevitably leads to strife, as experience proves.

State capitalism—that is, in the sense of the capitalistic system—is inevitable, but the issue that concerns the populations of every country of the world (and, incidentally, "the medical profession") is whether an industry in particular or industry in general is to be "taken over" by the government class from the private enterprise class, and who are often wrongly termed "the capitalist class" in a derogatory manner by those people who wish to take their place in possession and power—that is, under the guise of "the State"—without earning such in the open arena of competition and hard-won experience within their own country. The government class live by the magic power of taxation of profitable industry, and the more unnecessary and unprofitable their services and transactions, the higher the cost of living and restriction of wealth production.

But Dr. O'Day says, "it is not a question of socialism. A socialist may or may not endorse nationalization", when obviously the socialist (the person who believes in a philosophy termed "socialism") could only endorse socialization of all and sundry—that is, dictatorship.

Nor, again, is socialism "a political economy", for the former merely denotes a philosophy, whereas the latter signifies an economic system that can only be either barter or the capitalistic system of production, distribution and exchange, and the key to which is profitable industry or else bankruptcy. There are some countries, of course, where democracy is not, at present, practicable without specific education.

It is obvious, therefore, that the more the government class "take over" business from the rest of the community

(in a democracy), the straighter the road to bankruptcy or to autocratic dictatorship, and which, as experience proves, always leads to strife and eventual war. This latter phenomenon can, perhaps, be explained by the suggestion that all gilded and fervid philosophy leading to aggressive dictatorship is false, and, when attempted to be put into practice, must be associated with force in opposition to reason founded on natural law and thus inevitably heading towards inimical reactions, for natural law cannot be altered by human actions prompted by some false theories whether entitled socialism, communism, fascism, collectivism, clericalism or any other verbal idol, and neither robbery, prison nor murder has ever turned fallacy into truth. The philosophy on which democracy (broadly speaking) is founded has withstood the test of time and two world wars, and, therefore, and quite regardless of the indifference of the average democratic citizen towards improvement thereof, it may be accepted that the democratic code more nearly harmonizes with natural law than any form of autocracy.

Yours, etc.,

138, Darlinghurst Road, Darlinghurst, New South Wales.
NORMAN PERN.

March 4, 1946.

SIR: A sophist is defined as one of a class of men who taught eloquence, philosophy and politics in ancient Greece, and who by their fallacious but plausible reasoning puzzled inquirers after truth, weakened the faith of the people and drew upon themselves general hatred and contempt.

Throughout the passing years, this type of propaganda has been used to delude people by the intoxication of wordy slogans, rather than by educating them through the exercise of reason.

Communists are master hands at this type of propaganda; in fact, it is said that there is in Russia a school wherein instruction in the art of using political formulæ is given. We have a good example of sophistry in Dr. O'Day's criticism of Dr. John Dale's address. Happily sophists generally succeed in contradicting themselves, although the contradictions are not always apparent to those uninitiated in this art. Let us follow Dr. O'Day. He states: "Socialism is a political economy, in which the means of production, including the land, are owned collectively."

Now, whether such a state of things is possible or not will not be discussed. But it is plain to anyone who considers the meaning of this definition, and it has been proved by a logical examination of collectivism, that the only way in which such a system could be established and continued would be by an equal distribution of the wealth produced.

This conclusion is also inherent in the formula once so loudly proclaimed by the communist. "From each according to his means, to each according to his needs." This absurdity was, of course, a correct inference to the socialistic premise. But it was found (as all, except the blind followers of the Marxist religion knew it would be found) to be unworkable by the communists in Russia. Now we have a new formula. Dr. O'Day goes on to say: "And payment is made according to quantity and quality of work done." This is the method of reward, and the only method of reward that could be regarded as in accordance with economic law. And we all hope that it will be a reality someday. But it is a direct contradiction of the theory of collectivism, which necessitates perfect equality of rewards.

Readers of your journal need hardly bother about the rest of Dr. O'Day's letter; his system of communism stands or falls upon the justice of equal payments. In Russia we have a very large disparity of rewards. In conclusion, may I ask readers to ponder over one or two of the mystic pomposities in this laughable letter. Here is one: "Materialists . . . write no mystic nonsense about the State. They . . . regard the State as an organ of power, directed against external and internal enemies."

The current and past events certainly truly exemplify the power attitude of the State as extolled by both fascists and communists. The State indeed is an organ of power with them, and centralized power such as must and does exist in both fascist and communistic economics always rests upon the dictatorship of one man, or a small group of men, who govern by the tyranny of the secret police and the death chamber. "Till we have the world . . . in which the administration of things replaces the administration of persons." Here is another of these resounding phrases. What on earth can this nonsense mean, but the relegation of people to the caption of things, which after all is really the communistic objective, that is, the slave State.

Sir, I pray that members of our profession will not be misled by such vapourings, which come and go as the intoxicated devotees of this new religion crave for other and more potent poisons. The cry of "the classless society" has now vanished; so will the "Stateless State" formula change when the dictators in Moscow consider it has served its purpose.

It is indeed naïve of Dr. O'Day to compare the birth of the new world to the birth of a baby, and to suggest that as we have studied the laws of obstetrics, so we should study the laws governing the growth of society. Our experience of the birth of communism and fascism is not likely to deceive anyone that in the future the birth of the new order of society that Dr. O'Day wishes for will be according to law.

The only way these delightful social experiments have been brought to being is by methods of violence, such as has no analogy whatsoever with obstetrical practice either ancient or modern.

I find only admiration for Dr. John Dale's clear and convincing address.

Yours, etc.,

111, Collins Street, Melbourne,
PAUL G. DANE.

March 11, 1946.

RECENT ADVANCES IN THE DIAGNOSIS AND TREATMENT OF LUMBAR INTERVERTEBRAL DISK DISEASE.

SIR: After reading the correspondence of Douglas Miller in your publication of February 23, 1946, I was tempted to ignore his remarks.

On second thoughts, I decided that it is a duty to reply to them, not, certainly, in terms of a discussion between members of a profession whose object should be progressive in its attempts to remove or to alleviate the disabilities of his fellow men, but rather in chiding terms, because of the nature and tone of your correspondent's composition.

I wish, first of all, to apologize to Mr. Hugh Trumble, if, through Douglas Miller's agency, I have in any way disparaged Mr. Trumble's observations regarding the "mobility test" described by Dandy. I will always be happy to demonstrate my interpretation of this test, when a case is available, should he care to come so far.

Douglas Miller's comments on the observations and opinions expressed in my paper appear to me to be based on distortion of my printed words.

Furthermore, I am sure that most of your readers will regret that the term "massive experience" has crept into our Australian medical literature.

I would have enjoyed the reading of, and the privilege of replying to, the criticism of professional brethren in the spirit usually expressed in your columns.

Yours, etc.,

Yorkshire House, St. George's Terrace, Perth.
FRED CLARK.

March 5, 1946.

AUSTRALIA AND SCIENCE: THE UNIVERSITY OF SYDNEY AND SCIENTISTS.

SIR: In your editorial of February 23 you state that one function of a university is to "foster the genius of the gifted student" rather than to educate the multitude. I agree rather with Winston Churchill, who in America recently praised Americans because their university graduates could be numbered in tens of millions, and told all ex-servicemen to seek a university education.

In this connexion I think it time that the other universities of Australia copied the University of Western Australia and ceased to charge fees. Thousands of Western Australians have now attended the university taking courses in arts, science, law, engineering and agriculture without paying a penny for lectures. This year a faculty of dentistry is to be founded.

If the comparatively poor people of this State can afford a free university open to any citizen of Australia, why can't the wealthy State of New South Wales? Why should the free system of State education come to a sudden full stop after students have passed their Leaving Certificate?

I maintain that free university education is more important than uniform railway gauges, which will cost very many millions of pounds.

Yours, etc.,

F. W. SIMPSON.

271, Cambridge Street,
Wembley Park,
Western Australia.
March 7, 1946.

SIR: The implications in Dr. N. E. Goldsworthy's letter to the journal of March 9 are very derogatory to scientists and science.

Science, pure and applied, plays such a major role in the life of the twentieth century, that it is foolish to say that scientific subjects are not cultural, nor essential to a modern education. One purpose of education surely is to equip the individual with a broader and more critical outlook on life, so as to better adapt himself to society, and to improve society for the benefit of others. Therefore, in a scientific age, a scientific eduction is essential for such an outlook.

I wish in no way to detract from the importance of the humanities, literature, history, art *et cetera*; these also are necessary for a full life. My contention is that in the realm of education and culture the arts and sciences are equal partners (not antagonists), both essential to the truly educated person. To ignore the importance of one is to detract from the other.

Therefore salaries of university lecturers in all schools should be raised so as to attract the keenest intellects, both here and overseas, to these so responsible positions.

Yours, etc.,

DAVID R. MOORE.

Balmain and District Hospital,
Booth Street,
Balmain.
March 10, 1946.

ULCERS IN THE MOUTH: AN APPEAL FOR HELP.

SIR: In answer to your correspondent's request for advice on treatment of chronic buccal ulcers, I might mention one such case that I was called upon to treat. This patient had also a mild degree of anæmia which was normocytic and hypochromic, and did not respond to iron. Finally, for no good reason, and purely as a shot in the dark, I gave her a course of "Campolon", two millilitres twice weekly for twenty injections. She lost her ulcers and I have not seen her since. Whether she recovered because of or in spite of the liver therapy I do not know.

Yours, etc.,

LANCE HEWITT.

Cambridge Street,
Enmore,
March 7, 1946.

SIR: The problem of the oral ulcer recently raised in these columns is one on which I have sought help for many years, with, alas, negative results. My wife has suffered from them intermittently for many years and no type of treatment seems to make much difference to their duration or cure. One factor which may provide a clue is that the ulcers seem to be more frequent in warm weather. This may be due to the fact that more sugar is apt to be ingested in the form of stewed fruit, ice-cream, soft drinks, jelly and allied sweets.

Most sufferers from oral ulcer seem to have good digestions, as far as one can ascertain. Patients suffering from peptic ulcer, on the other hand, do not seem to be subject to oral ulcer.

Yours, etc.,

A. BULTEAU.

Gladesville,
New South Wales,
March 13, 1946.

THE FEDERAL MEDICAL WAR RELIEF FUND.

SIR: With reference to the Federal Council's circular appealing for a large sum to form a fund for necessitous returned soldier members, surely it would be more fitting for the British Medical Association to exercise itself in finding us jobs instead of insulting us with charity! There already exist many organizations, munificently endowed, whose function it is to assist returned soldiers whether dustmen or doctors. But it is nobody's business to find jobs for returned doctors.

In my speciality—radiology—every paid job in Victoria, with the natural exception of the Repatriation Department, is held by a non-returned soldier. I would suggest, sir, that the British Medical Association confine its "relief" work to ensuring, with due regard to the *Preference Act*, that paid appointments go to members according to what, and not whom, they know.

Some two years ago I put forward the suggestion that returned soldier matters could best be handled by the formation of either Returned Soldier League sections of the British Medical Association or British Medical Association sub-branches of the league. This circular would seem to stress the advisability of such a course of action.

Yours, etc.,

MARY THORNTON.

Warrandyte,
Victoria,
March 9, 1946.

SIR: When in 1945 the Federal Council decided to inaugurate the Federal Medical War Relief Fund it had before it the splendid record during the past twenty-seven years of the Medical Officers' Relief Fund (Federal) which had helped forty-seven medical officers financially by way of loans and had given medical benevolence to thirty-two widows, children and dependent relatives of deceased service medical officers. This fund is still helping five medical officers with loans and giving medical benevolence to seven beneficiaries.

In asking members of the profession to give generously to this new fund, the Federal Council is not unmindful of its duty to help in the reestablishment of service medical officers, and State rehabilitation committees have been active in surveying the openings for men who desire to take up practice in cities and towns, in specialities and in salaried positions.

It is felt that there may be a number of medical officers who need temporary financial help, in spite of the many organizations, munificently endowed, and who would prefer to obtain that help wholly within the profession which owes so much to them. I would remind Dr. Thornton of the splendid work of legacy, and surely the widows and fatherless children of our deceased members are our legacy. It behoves us to do all in our power to give these dependants the same chance that they would have had had their fathers survived.

Most medical officers who served in the last war and in World War II joined the Returned Soldiers' League on discharge and are proud to wear the badge, but it is felt that it would be unfair to ask special treatment from the league when we have our own organization which has as one of its objects, "to form a bond of union among members of the profession and a medium through which their opinions can be readily ascertained and expressed".

The Federal Council has stressed day in and day out that all wartime appointments should be temporary and that there should be no change in the set-up of medical practice by any government while such a large number of its members were on full-time service.

Dr. Thornton's letter shows that she has entirely missed the point of its appeal, and may I join with the president in asking our members to give generously, to give until it hurts.

Yours, etc.,

W. F. SIMMONS,
Honorary Treasurer.

The Federal Council of the British Medical Association in Australia,
135, Macquarie Street,
Sydney.
March 14, 1946.

TREATMENT OF GUNSHOT WOUNDS OF THE CHEST IN THE FIELD BY PENICILLIN THERAPY.

SIR: I read with considerable interest the report of Rose and Newson in your issue of March 2, 1946. I was particularly interested in the incidence of intrapleural complications. There were five intrapleural infections and one uninfected fibrinohæmothorax in twenty-four cases of hæmothorax with or without lung damage.

Although I realize that the statistical significance of a small series is nil, I feel that a brief report of the local treatment of eleven cases in which lung damage was sustained may be of interest. Cases in which the chest wall only was injured were uncomplicated and have been excluded.

During June and July, 1945, thirteen patients with hæmothorax, with penetration or perforation of the lung by metallic foreign bodies, were admitted under my care. Two died within a few hours of admission. The remaining eleven included two with associated compound fracture of the humerus and three with thoraco-abdominal wounds. All these recovered and none developed intrapleural complications.

Treatment of these patients along general lines was similar to that described by Rose and Newson, although the early transfusion of blood was avoided in uncomplicated cases.[1]

Local treatment differed in three respects:

1. *Operative Surgery.*—This was avoided as far as possible unless indicated for associated wounds. Two of the chest wounds had not been closed by the regimental medical officer. These were closed in the ward without formal excision.[1] The remainder were left undisturbed and all healed well.

2. *Aspiration.*—Daily aspiration of not more than 500 millilitres was carried out, starting forty-eight hours after wounding, and continued until the chest became dry and remained dry. It was felt that delay in commencing aspiration and the removal of a conservative amount of fluid each time would give the wounded lung a chance to seal off.

3. *Local Penicillin.*—Ten millilitres of a solution of penicillin, containing 250 units per millilitre, were injected after the aspiration of each 500 millilitres of fluid. Smaller amounts were injected as the hæmothorax decreased. Larger amounts were avoided for two reasons. First, the irritant effects of penicillin in any but very dilute solutions is well known. It is for this reason that intravenous therapy has been almost universally discarded. Secondly, following Garrod's[2] work, it seemed that with a larger dose the rate of disinfection would certainly not be increased, and would probably be retarded. Even the quantity used was probably a little high.

In conclusion, I would point out that the patient in Case X described by Rose and Newson did very well, even though he had multiple retained foreign bodies, and was not treated according to their criteria for aspiration and injection of penicillin. Aspiration was not performed within twenty-four hours of wounding as they advise, nor were 50,000 units of penicillin injected after the first two aspirations. In fact, this man had only 50,000 units intrapleurally in fourteen days, the lowest amount of their series.

Yours, etc.,

Royal Hobart Hospital,
March 8, 1946.

P. BRAITHWAITE.

References.

[1] C. W. B. Littlejohn: "Report on the Early Treatment and Results of Penetrating Wounds of the Chest", *The Australian and New Zealand Journal of Surgery*, Volume XI, January, 1942, page 147.

[2] Lawrence P. Garrod: "The Action of Penicillin on Bacteria", *British Medical Journal*, January 27, 1945, page 107.

TSUTSUGAMUSHI DISEASE: A WARNING.

SIR: With the impending return of the civil population to New Guinea and the adjacent islands, I feel that publicity should be given to the necessity for preventing tsutsugamushi disease. It has long been known in Malaya that deserted and overgrown plantations are highly dangerous endemic foci for this disease. This fact was repeatedly verified during the New Guinea campaign.

The only satisfactory protective measure at present known is the application of miticides such as di-butyl phthalate or benzyl benzoate. These can be applied by smearing the clothing with two ounces of either, or by impregnating it with a 5% emulsion (a 2% soap solution makes a satisfactory emulsifying agent). In the latter method the clothes are steeped in the emulsion, wrung out, and allowed to dry. Such clothes remain impregnated for three weeks, even after three washings. All the clothing, including socks, but excluding underpants, should be treated. As an added precaution, boots or shoes should be smeared daily.

To destroy mites in areas where huts *et cetera* are to be built, local spraying with creosote or a 5% solution of "666" is suitable; but it must be noted that "D.D.T." is not effective against mites. However, until areas can be satisfactorily cleared of mites and their rodent hosts, clothing impregnation should be practised by all outside workers.

Yours, etc.,

The University Club,
Sydney,
March 14, 1946.

J. T. GUNTHER.

Naval, Military and Air Force.

DECORATIONS.

Lieutenant-Colonel (Temporary Colonel) Harry Medcalf Fisher has been created an officer of the Military Division of the Most Excellent Order of the British Empire for "brave conduct, unselfish service and skilful handling of medical services".

Lieutenant-Colonel (now Temporary Colonel) John Murray Blair, Lieutenant-Colonel Donald Alastair Cameron and Major (Temporary Lieutenant-Colonel) (now Lieutenant-Colonel) Munro Scott Alexander have been created officers of the Military Division of the Most Excellent Order of the British Empire for "meritorious service and outstanding devotion to duty".

Captain Hugh Busby has been awarded the military cross for "brave conduct and exceptional devotion to duty in assisting sick and wounded personnel".

The following officers have been mentioned in dispatches for "distinguished services" in the South-West Pacific Area: Lieutenant-Colonel (Temporary Colonel) Noel Hunter West Saxby, O.B.E., Lieutenant-Colonel Stanley Charles Matthew Hiatt, Lieutenant-Colonel Paul William Hopkins, M.C., Lieutenant-Colonel William Ernest Edward Langford, Lieutenant-Colonel Kelvin Alexander McGarrity, Lieutenant-Colonel Stanley Devenish-Meares, Lieutenant-Colonel Arthur Hunter Powel, D.S.O., V.D., Lieutenant-Colonel Clive Herbert Selby, Lieutenant-Colonel Harley Irwin Turnbull, Major Keith Boyce Armstrong, Major Thomas Clive Backhouse, Major John Martin Downing, Major Mervyn Bruce Duncan, Major Thomas Keep Durbridge, Major Dudley De La Force Henry, Major Ian Campbell MacDonald, Major James Frank Stewart McKee, Major Hedley Ray Millikan, Major Peter James Parsons, Major Thomas Frederick Rose, Captain Richard James Bottcher, Captain Hugh Glynn-Connolly, M.C., Captain Anthony Francis McSweeney, Captain Alan Scurrah, Captain Thelma Gillespie Secretan.

CASUALTIES.

ACCORDING to the casualty list received on March 12, 1946, Major D. R. McFarlane, Caulfield, Victoria, is reported as having died of illness.

THE FEDERAL MEDICAL WAR RELIEF FUND.

THE following contributions to the Federal Medical War Relief Fund have been received.

Victoria.

T. F. Ryan, Marion B. Wanliss, J. Jamison Black, Fay Maclure, £100.

John S. Green, £52 10s.

John H. Shaw, G. R. A. Syme, W. R. Groves, £50.

W. F. Brownell, £30.

S. Ingwersen, G. R. Felstead, £25.

D. Bickart, A. E. Coates, Konrad Hiller, Donald Nance, Annonymous, £21.

Mary De Garis, G. M. Scott, C. Sutherland, Mona M. Blanch, F. V. Scholes, £20.

L. F. Clendinnen, H. F. Praagst, R. Kaye Scott, £17 10s.

D. Brown, Vernon Davies, £15 15s.

B. L. Stanton, C. B. Melville, B. McColl, D. Thomson, F. G. Fenton, G. C. Love, E. Rogerson, Lewis Phillips, Clive Shields, H. B. Rudduck, H. H. Martin, R. Walmer Weaver, N. L. Dodd, Walter Williams, J. A. O'Brien (first instalment), H. Peake, A. L. Thom, I. J. Paull, M. Snow, J. C. P. Strachan, Alice M. Barber, Walter Summons, J. H. Paterson, J. H. Sleeman, George Simpson, E. W. Sutcliffe, L. Potter, J. K. MacKenzie, D. C. Worch, A. P. Derham, J. A. Smeal, E. R. Cordner, M. H. Mailer, J. C. Douglas, E. Danby, James M. Andrew, C. H. Prouse, R. S. Lawson, R. N. Naylor, Gladys Hallows, G. M. Tallent, P. R. Slater, E. T. Cato, H. C. Disher, Harley Grover, F. M. Burnet, F. Rosanove, A. I. Chapman, Lorna D. Jones, Winifred Mackenzie, W. L. Colquhoun, J. S. Ormond, W. Ward, J. A. Cahill, F. J. Bonnin, Ernest Guymer, E. J. C. Hamp, J. C. Harper, R. Stott, W. H. J. Moore, A. Saleeba, J. Patrick, P. Langmore,

J. S. Murphy, N. N. Harrington, K. J. O'Day (first instalment); E. Sandner, £10 10s.

E. R. Killmier, £8.

J. Rowan, £7 7s.

J. E. Thomas, £6 6s.

F. R. Meagher, L. Joel, B. Ross-Woods, F. E. Langley, J. Summons, J. L. Bignell, J. A. McLean, E. M. Inglis, B. Vaughan (first instalment), F. G. Stephens, F. Hetherington, T. V. Nihill, V. Hurley, C. F. MacGillicuddy, J. Moreland, W. A. Bossence, £5 5s.

R. Clarke and E. C. Edgerton (joint contribution), M. Cockbill, Mary R. Herring, J. Horace Downing, Jessie B. Simpson, A. R. Kelly, A. A. Crooks, T. Vorrath, Kenneth Smith, H. I. Robinson, G. A. Prior, Annonymous, £5.

F. J. Colahan (first instalment), Leonard W. Johnston (first instalment), A. L. McInnes, £4 4s.

G. E. Cole (first instalment), Elizabeth White, J. V. Ashburner, £3 3s.

C. E. Sawrey, A. C. Reith, K. Heard, L. Kirsner, A. J. Aitken, Victor Brand, John Body, A. L. Hare, R. K. Doig, B. Ostberg, W. Hamilton Smith, W. J. Craig, £2 2s.

J. J. Hamilton, Frank Kenny, John H. Colebatch, E. A. Daley, £1 1s.

Total: £1,871 12s.

Grand total to date: £3,897 7s. 3d.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Pope, David Carington, M.B., B.S., 1942 (Univ. Sydney), 62, Roseville Avenue, Roseville.

McCaffery, Louis Henry, M.B., B.S., 1945 (Univ. Sydney), 7, Kent Street, Epping.

McNamee, Kevin Matthew, M.B., B.S., 1939 (Univ. Sydney), High Street, West Maitland.

Scanlan, Derrick, M.B., 1940 (Univ. Sydney), 16, Terrace Street, Newcastle.

Medical Appointments.

The following have been appointed honorary clinical assistants at the Royal Adelaide Hospital, Adelaide: *Medical Section*, Dr. S. M. L. Dunstone; *Surgical Section*, Dr. B. E. Lawrence; *Gynæcological Section*, Dr. H. E. Pellew and Dr. H. F. Hustler.

Dr. J. R. Cornish has been appointed honorary anæsthetist at the Royal Adelaide Hospital, Adelaide.

Dr. J. P. Ainslie has been elected a member of the Senate of the University of Western Australia.

Dr. A. N. Kingsbury has been appointed a member of the Food Standards Advisory Committee under the provisions of section 201 of the *Health Act*, 1911-1944, of Western Australia.

Books Received.

"The Diagnosis of Nervous Diseases", by Sir James Purves-Stewart, K.C.M.G., C.B., M.D. (Edin.), F.R.C.P.; Ninth Edition; 1945. London: Edward Arnold and Company. 8½" × 5½", pp. 888, with many illustrations. Price: 40s. net.

"Food Yeast: A Survey of its Nutritive Value", by the Accessory Food Factors Committee, Medical Research Council, War Memorandum No. 16; 1945. London: His Majesty's Stationery Office. 9½" × 6", pp. 16. Price: 3d.

"Synopsis of Obstetrics and Gynæcology", by Aleck W. Bourne, M.A., M.B., B.Ch. (Cambridge), F.R.C.S. (England), F.R.C.O.G.; Ninth Edition; 1945. Bristol: John Wright and Sons Limited. London: Simpkin Marshall (1941) Limited. 7½" × 5", pp. 507, with illustrations. Price: 21s. net.

"The Symptomatic Diagnosis and Treatment of Gynæcological Disorders", by Margaret Moore White, M.D. (London), F.R.C.S. (England), M.R.C.O.G., with a foreword by F. J. Browne, M.D. (Aberdeen), D.Sc., F.R.C.S. (Edinburgh), F.R.C.O.G.; Second Edition; 1946. London: H. K. Lewis and Company Limited. 8½" × 5½", pp. 256, with 108 illustrations. Price: 16s. net.

"Psychological Medicine: A Short Introduction to Psychiatry with an Appendix on Psychiatry Associated with War Conditions", by Desmond Curran, M.B., F.R.C.P., D.P.M., and Eric Guttmann, M.D., M.R.C.P., with a foreword by J. J. Conybeare, D.M. (Oxon.), F.R.C.P.; Second Edition; 1945. Edinburgh: E. and S. Livingstone Limited. 8½" × 5½", pp. 254, with illustrations. Price: 10s. 6d., postage 6d.

Diary for the Month.

MARCH 26.—New South Wales Branch, B.M.A.: Council Quarterly.
MARCH 27.—Victorian Branch, B.M.A.: Council Meeting.
MARCH 28.—New South Wales Branch, B.M.A.: Annual Meeting.
APRIL 2.—New South Wales Branch, B.M.A.: Council.
APRIL 3.—Western Australian Branch, B.M.A.: Council Meeting.
APRIL 3.—Victorian Branch, B.M.A.: Branch Meeting.
APRIL 4.—South Australian Branch, B.M.A.: Council Meeting.
APRIL 5.—Queensland Branch, B.M.A.: Branch Meeting.
APRIL 9.—Tasmanian Branch, B.M.A.: Ordinary Meeting.
APRIL 9.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
APRIL 9.—New South Wales Branch, B.M.A.: Organization and Science Committee.
APRIL 12.—Queensland Branch, B.M.A.: Council Meeting.
APRIL 16.—New South Wales Branch, B.M.A.: Medical Politics Committee.
APRIL 16.—New South Wales Branch, B.M.A.: Ethics Committee.
APRIL 16.—New South Wales Branch, B.M.A.: Clinical Meeting.
APRIL 17.—Western Australian Branch, B.M.A.: General Meeting.
APRIL 18.—Victorian Branch, B.M.A.: Executive Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All Public Health Department appointments.

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MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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